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12 PASS

# WAR MACHINE

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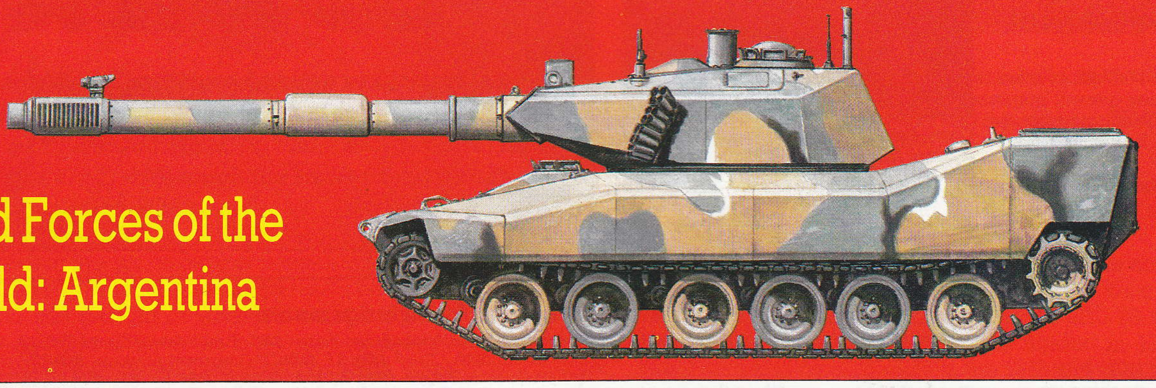

Armed Forces of the World: Argentina

The Future of the Tank

The FV90 Family

The T-72 in Action

A fully illustrated guide to The New Generation of Fighting Vehicles

# WAR MACHINE

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**Managing Editor:** Stan Morse
**Editorial:** Trisha Palmer
Chris Bishop
Chris Chant
Ian Drury

**Design:** Rod Teasdale
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Dave Etchell
Peter Sarson & Tony Bryan

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**Subscription Manager:** Christine Allen
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**Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.**

**Distribution and marketing offices:**
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Orbis House
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Telephone: 01-379 6711

**Circulation Manager:** Brian Anderson
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# The New Generation of Fighting Vehicles

*Finland is one of the latest countries to receive the T-72 main battle tank from the Soviet Union. The Soviets have managed to keep secret the critical details of the tank's fire control systems and the composition of its armour; exported vehicles may, of course, be different to those in the Red Army.*

***A new generation of armoured fighting vehicles is entering production. Main battle tanks are evolving to counter the threats posed by guided missiles, and a new breed of light tanks has appeared, with much the same firepower as an MBT but at a fraction of the cost.***

Previous studies in this series have concentrated on one particular type of armoured fighting vehicle, for example main battle tanks, reconnaissance vehicles, and tracked or wheeled armoured personnel carriers.

This study is rather different as it covers a wide range of armoured vehicles that have been developed in recent years, some of which have yet to enter production or service. Many of these vehicles (such as the AMX-40, Vickers Mk 7 and Stingray) have been designed specifically as private ventures with company funding, and are aimed at the export market.

For many years armoured fighting vehicles were designed and built only by highly industrialized Western countries. Since the early 1970s, however, other countries have started their own armoured vehicle industries, Brazil being a good example. The ENGESA company started building the Cascavel and Urutu 6×6 armoured vehicles, and in 1985 unveiled its EE-T1 Osorio MBT which is at present competing against European tanks in the Middle East market. Egypt has recently designed and built the Fahd armoured personnel carrier to meet the requirements of the Egyptian army and other potential customers in the Middle East.

Some countries are now placing increased emphasis on their airborne or airmobile forces, so this study includes the Wiesel lightweight armoured vehicle which should enter service with the West German army later this decade, and the private-venture Cadillac Gage Stingray and FMC Close Combat Vehicle – Light, which have been designed to be transported and dropped by parachute from a standard Lockheed C-130 Hercules transport aircraft.

The Soviets continue to field new weapons and equipment: sometimes these are in advance of anything in the West, while in other areas they lag behind. A good example is the ZSU-23-4 self-propelled anti-aircraft gun system which was first fielded in 1960s and caused the Israeli air force much trouble in the 1973 and 1982 Middle East conflicts. In 1985 the US cancelled its Sgt York DIVAD twin 40-mm air-defence system as it had so many shortcomings. The US Army now urgently needs a low-level air-defence system, and will probably have to buy something already in production, perhaps from Europe.

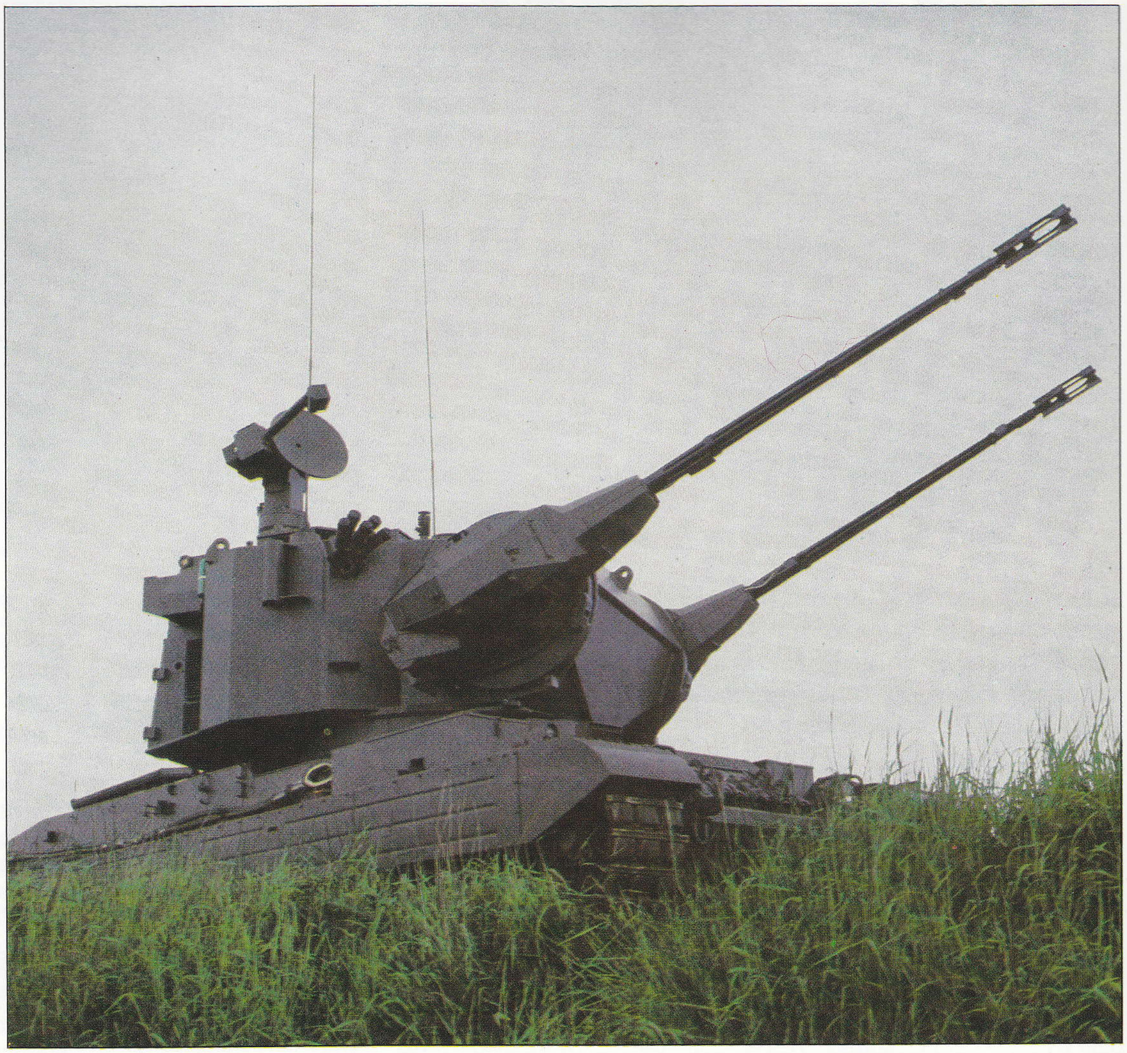
Armoured fighting vehicle design is now at the crossroads, and future tanks may well look quite different to the ones in service today. Automatic loaders are already installed in the S-tank and Soviet T-64/T-72 vehicles, and it has been confirmed that the new French MBT expected to enter service in the 1990s will also have a three-man crew and an automatic loader.

Although anti-tank guided weapons have been introduced on a large scale over the past 20 years, the armoured fighting vehicle (especially the MBT) still has a key role on the battlefield of the future and perhaps has no real substitute.

*The Brazilian arms industry has been advancing by leaps and bounds, and ENGESA have now produced the Osorio main battle tank, seen here firing its British Royal Ordnance 105-mm (4.13-in) gun. Developed with the export market firmly in mind, the chassis will form the basis for a series of AFVs.*

UK

# Marksman air-defence system



*With the ominous exception of Britain, most armies use a mixture of guns and missiles to defend themselves against air attack. Marksman is an AA gun system developed by Marconi and is able to fit on to most tank chassis with minimal modification.*

Mechanized forces have always been vulnerable to attack from the air, but in recent years this threat has grown with the advent of new and dedicated attack aircraft which can fly very low and attack targets on the first pass. The introduction of the attack helicopter carrying guided missiles, rapid-firing cannon and unguided rockets has added a new dimension to land combat.

A number of countries in the West have fielded complete self-propelled anti-aircraft systems (for example the West German Gepard and French AMX-30 DCA) to protect mechanized forces against attack by such aircraft and helicopters.

Marconi Command and Control Systems has designed and built air-defence radars for land and sea applications over a period of many years, and some years ago undertook a market survey which showed that there was a gap in the market for a complete all-weather air-defence turret which could be fitted onto existing Chieftain, Challenger, Centurion, T-54/T-55, Type 59, M48, M60 and Vickers tank chassis with the minimum of modification. By using a chassis already in service the user would have significant cost advantages as not only would the crews already be familiar with the automotive aspects of the chassis but spare parts would already be available.

The first prototype of this air-defence turret, called **Marksman**, was completed in mid-1984 and shown for the first time at the British Army Equipment Exhibition on the Vickers Mk 3 MBT chassis.

Major sub-contractors to Marconi Command and Control Systems are Vickers Defence Systems of Newcastle upon Tyne, which built the all-steel turret, and Oerlikon-Bührle, which supplied the twin 35-mm KDA cannon and ammunition.

The turret is of all-welded construction providing the crew with complete protection from small arms fire and shell splinters. The commander sits on the left and the gunner on the right, and in addition to having periscopes for all-round observation with the hatches closed, each has a roof-mounted gyro-stabilized sight with magnifications of ×3 and ×10. The gunner's sight also has a laser rangefinder.

The turret armour provides complete protection against 14.5-mm (0.57-in) rounds over the frontal arc and against 7.62-mm (0.3-in) armour-piercing bullets over the remainder.

Mounted on the roof of the turret is a Series 400 radar, which is unusual in that it uses a single antenna for surveillance and tracking, and this has a maximum range in the surveillance mode of about 12 km (7.5 miles).

A considerable amount of effort has gone into the design of the fire-control system to make its operation as simple as possible. The complete system includes the roof-mounted radar, computer, transmitter, synthesizer, signal processing unit, control console (visible to both crew members), data extraction unit and radar power amplifier. The system has a number of operating methods, including fully automatic. In this mode the radar picks up the target, checks that it is hostile and then starts to track the target; the turret is then traversed, the guns elevated, and the gunner informed when the target is within effective range; all the gunner then has to do is press the firing button.

The cannon can also be laid with the aid of the roof-mounted sights, this being of particular use when electronic countermeasures are being used to degrade the performance of the radar.

By early 1986 the prototype Marksman turret have been tested on Centurion, Challenger and T-series tank chassis. In the case of the Challenger, the Marksman turret was installed and operating in just under one and a half hours.

The 35-mm cannon are the same as those installed in the Gepard, and the gunner can select single shots, bursts or full automatic fire. Each cannon has 230 rounds of ready-use air-defence ammunition and 20 rounds of APDS-T (Armour-Piercing Discarding-Sabot Tracer) for engaging ground targets.

## Specification

**Marksman**

**Crew:** 2

**Armament:** two 35-mm cannon

**Ammunition:** 230 anti-aircraft and 20 anti-armour rounds per barrel

**Turret traverse:** 360°

**Cannon elevation:** −10° to +85°

**Weight:** 11000 kg (24,250 lb)

UK

# Vickers Mk 7 main battle tank

In the late 1970s Vickers Defence Systems designed and built as a private venture the Valiant MBT which made its first public apperance during the 1980 British Army Equipment Exhibition. This was armed with a 120-mm (4.72-in) Royal Ordnance tank gun and a Marconi fire-control system, and was designed to have the new Chobham armour. The Valiant was demonstrated in the Middle East but no orders were placed.

Vickers Defence Systems then discovered that a number of customers believed that the turret of the Valiant could be married to a chassis incorporating automotive components of the Leopard 2 MBT currently in service with the West German and Dutch armies, and also ordered by the Swiss army. The first prototype of this tank, called the **Vickers Mk 7**, was completed in mid-1985 and later in that year went to Egypt for trials. This tank has been designed specifically for the export market as the British army is already taking delivery of the heavier Challenger MBT armed with the same gun.

The Vickers Mk 7 is fitted with the standard Royal Ordnance 120-mm L11A5 tank gun, a McDonnell Douglas Helicopters 7.62-mm (0.3-in) Chain Gun being mounted co-axial with the main armament. A total of 38 rounds of 120-mm and 3,000 rounds of machine-gun ammunition are carried.

As an alternative to the L11A5 a West German Rheinmetalal 120-mm smoothbore gun can be installed.

The Vickers Mk 7 has a Marconi Command and Control Systems Centaur 1 fire-control system: both the commander and gunner can aim and fire the gun, and the main armament is stabilized in both elevation and traverse. The commander is provided with a roof-mounted French SFIM panoramic sight that allows him to scan through 360° without moving his head. The sight also incorporates a laser rangefinder. The gunner has a Vickers telescopic laser sight and a roof-mounted periscope sight.

Also mounted on the turret roof is a Philips UA9090 gyro-stabilized panoramic sight which provides a thermal picture on a TV screen at both tank commander's and gunner's positions. A very useful auto-scanning device is fitted: this scans a pre-set arc, and if there is a change in the thermal picture an alarm sounds, so alerting the crew.

The MTU diesel engine is coupled to Renk HSWL 354/3 automatic transmission with four forward and two reverse gears.

Standard equipment includes an NBC pack and a fire-extinguishing system for engine compartment, while optional equipment includes a roof-mounted anti-aircraft machine-gun, a fully automatic fire detection and suppression system for the crew compartment, and an air-conditioning system which is considered to be essential for operations in the Middle East.

### Specification

**Vickers Mk 7**

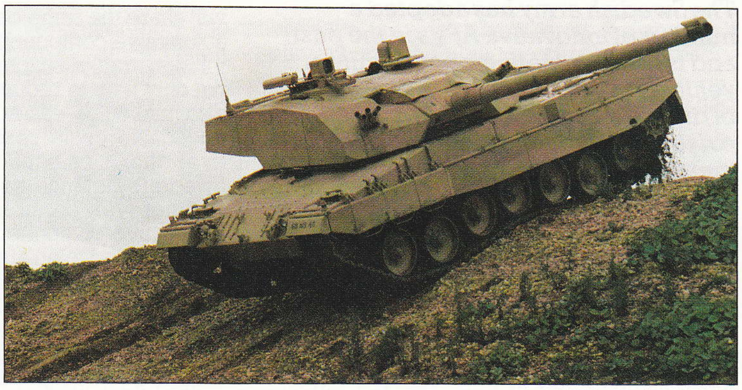
**Crew:** 4

**Weights:** empty 52640 kg (116,050 lb); loaded 54641 kg (120,460 lb)

**Powerplant:** one MTU MB 873 Ka 501 12-cylinder turbocharged diesel developing 1,500 bhp (1119 kW)

**Dimensions:** length, gun forward 10.95 m (35 ft 11 in) and hull 7.72 m (25 ft 4 in); width 3.43 m (11 ft 3 in); height overall 3.00 m (9ft 10 in)

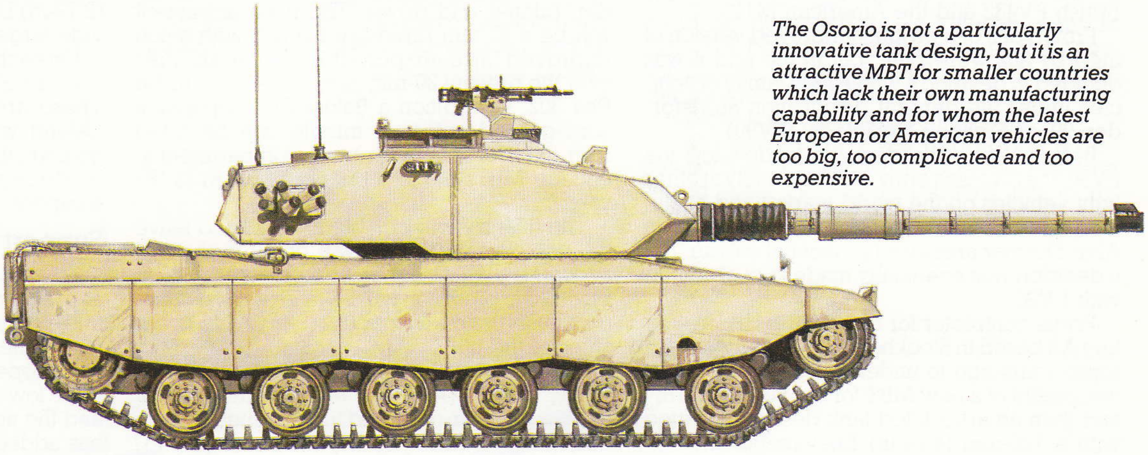
**Performance:** maximum road speed 72 km/h (45 mph); range 500 km (310 miles); fording 1.7 m (5 ft 7 in); vertical obstacle 1.1 m (3 ft 7 in); trench 3.0 m (9 ft 10 in); gradient 60 per cent, side slope 30 per cent



*The Vickers Mk 7 is a private venture by the company aimed purely at the export market. It combines the turret of the Valiant MBT, which failed to gain any orders, with automotive components of the German Leopard 2. It carries the powerful Royal Ordnance 120-mm (4.72-in) gun.*

BRAZIL

## ENGESA EE-T1 Osorio main battle tank



*The Osorio is not a particularly innovative tank design, but it is an attractive MBT for smaller countries which lack their own manufacturing capability and for whom the latest European or American vehicles are too big, too complicated and too expensive.*

Since the early 1970s the ENGESA company has built over 4,000 of its Jararac 4×4 scout cars, EE-9 Cascavel 6×6 armoured cars and EE-11 Urutu 6×6 armoured personnel carriers, sales having been made to virtually every continent. Several years ago the company decided to design and build a new MBT which would meet the needs of both the home and export markets. The first prototype, armed with the combat-proven British Royal Ordnance 105-mm (4.13-in) rifled tank gun, was completed in 1985. This was demonstrated in Saudi Arabia late in 1985 and the second prototype, armed with a French GIAT 120-mm (4.72-in) smoothbore gun, was completed early in 1986. Vickers Defence Systems of the UK designed both the 105-mm and 120-mm turrets specifically to meet the requirements of ENGESA.

The **EE-T1 Osorio** has an all-welded hull and turret. The conventional layout locates the driver at front left, the turret in the centre, and the engine and transmission at the rear. The 12-cylinder turbocharged diesel is coupled to a fully automatic transmission with four forward and two reverse gears.

The suspension is of the hydropneumatic type and has been designed by Dunlop of the UK. It has six road wheels with the drive sprocket at the rear and idler at the front; there are three track-return rollers.

Turret traverse is electric, and controls are provided for both tank commander and gunner. At present two fire-control systems are available for the EE-T1 Osorio. The first option is a an integrated fire-control system in which the gunner has a day/night sight with a laser rangefinder and the commander a day/night sight. The second fire-control option includes a stabilization system for the main armament allowing the gun to be fired against moving targets while the tank itself is moving across country. The tank commander has a roof-mounted SFIM stabilized periscopic sight with a laser rangefinder, while the gunner also has an SFIM stabilized sight with laser rangefinder. To enable targets to be detected and engaged at night, mounted on the turret roof is a Philips stabilized thermal camera which provides a TV picture on screens at the commander's and gunner's positions.

Mounted on each side of the turret is a bank of electrically-operated smoke-dischargers, and optional equipment (apart from the choice of main armament and fire-control systems) includes an NBC system, a fire detection and suppression system, a land navigation system, a laser detector and indirect fire control equipment.

Using components of the EE-T1 Osorio, ENGESA is now developing other variants including an armoured recovery vehicle, a bridgelayer, and an anti-aircraft gun vehicle.

### Specification

**EE-T1 Osorio**

**Crew:** 4

**Weights:** empty 37000 kg (81,570 lb); loaded 39000 kg (85,979 lb)

**Powerplant:** one 12-cylinder diesel developing 1,000 hp (745 kW)

**Dimensions:** length, gun forward 9.995 m (32 ft 9.5 in) and hull 7.08 m (23 ft 2.75 in); width 3.26 m (10 ft 8.3 in); height 2.371 m (7 ft 9.3 in)

**Performance:** maximum road speed 70 km/h (43.5 mph); maximum range 550 km (342 miles); fording 1.20 m (3 ft 11 in); vertical obstacle 1.15 m (3 ft 4 in); trench 3.0 m (9 ft 10 in); gradient 60 per cent; side slope 30 per cent

*Osorio is offered with a choice of armament, either the proven British 105-mm gun used all over the world or the French GIAT 120-mm smoothbore. The turrets for both weapons were designed by Vickers Defence Systems to ENGESA's requirements.*

# The FV90 Family

***The Swedish army has adopted a number of innovative AFVs in the past, and is now evaluating a new family of vehicles which will serve in a multitude of different roles. Extensive use of existing automotive parts will minimize unit costs.***

The Swedish army currently operates a fleet of over 1,000 Pbv 302 armoured personnel carriers built by Hägglund and Söner between 1966 and 1971. In addition to the basic APC with a turret-mounted 20-mm cannon, more specialized versions include an artillery fire direction post vehicle, an armoured command post vehicle, and an armoured observation post vehicle. The Bgbv 82 armoured recovery vehicle and the Brobv 941 armoured bridgelayer also share a number of common components with the Pbv 302.

When originally fielded, the Pbv 302 was an excellent design and had a number of advanced features not found on other armoured personnel carriers of this period, such as the British FV432 and the American M113.

Prototypes of a product improved version of the Pbv 302 were built, but in the end it was decided to develop a whole new family of vehicles under the general designation **Stridsfordon 90**, or **Fighting Vehicle 90 (FV90)**.

Before taking the decision to develop the FV90, the Swedish army looked closely at other light vehicles on the world market and evaluated a British Alvis Scorpion light tank and an Alvis Stormer armoured personnel carrier, but a decision was eventually made to push ahead with FV90.

Prime contractor for the FV90 is HB Utveckling AB based in Stockholm, a company formed some years ago to undertake design and development of a new MBT for the Swedish army and then an articulated tank destroyer armed with a 120-mm (4.72-in) Rheinmetall smoothbore gun. The former was never built and the latter was dropped after trials with a prototype.

HB Utveckling is only a small company with less than 10 staff and has two main subcontractors: AB Bofors which built all of the S-tanks for the Swedish army, and Hägglund and Söner which have extensive experience in building light tracked vehicles.

At present it is envisaged that there will be at least seven members of the FV90, all of which will share the same basic chassis and common automotive components such as engine, transmission, tracks, suspension and so on. This will not only help to reduce procurement costs but also make for easier training and much reduced life cycle costs, which are becoming ever more critical as pressure builds on Sweden's defence budget.

Wherever possible standard commercial automotive components, such as a diesel engine coupled to an automatic transmission, are being used in the FV90.

The main improvements of the FV90 over the current Pbv 302 can be summarized as dramatic improvements in armour protection, mobility and firepower which will lead to greater survivability on the battlefield. All of the series have virtually the same chassis and automotive characteristics.

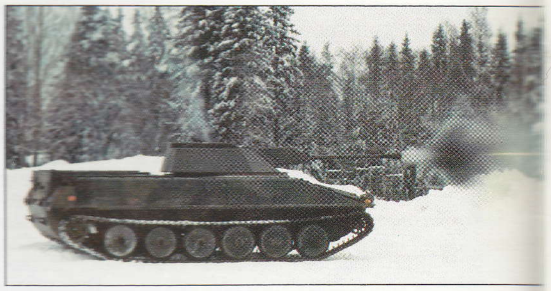
## Pbv L armoured personnel carrier

This is the basic APC of the series and will be able to carry eight fully equipped infantrymen plus a three-man crew consisting of commander, gunner and driver. The main armament will be a 25-mm rapid-fire cannon with much improved armour-penetrating capabilities over the present 20-mm cannon installed in the Pbv 302. In addition a Bofors BILL top-attack wire-guided anti-tank missile can be fitted over the roof of the rear troop compartment to engage MBTs out to a range of 2000 m (2,187 yards).

The infantry will be able to enter and leave the vehicle rapidly via twin doors in the hull rear, which will also have firing ports and vision blocks. No provision will be made for the infantry to use their 5.56 mm (0.219-in) rifles in the sides of the hull.

The **Pbv G** will have the same complement as the basic Pbv L but will be fitted with a two-man power-operated turret armed with an automatic cannon and a 7.62-mm (0.3-in) machine-gun.

A number of main armament types are under consideration, including the Bofors 40-mm L 70 and a 60-mm (2.36-in) high-velocity weapon from Israel Military Industries. The former is based on the well known anti-aircraft gun and, in addition to the normal range of ammunition, fires a specially developed APFSDS (Armour-Piercing Fin-Stabilized Discarding-Sabot) projectile which will easily penetrate vehicles such as the Soviet BMP-1 mechanized infantry combat vehicle, and go through the sides and rear of MBTs.



*The basic Armoured Personnel Carrier version of the FV90 is designated the Pbv L and carries eight fully equipped infantrymen and a crew of three (commander, gunner and driver). It is armed with a 25-mm cannon and can also mount the Bofors Bill top-attack ATGM.*

The turret will be fitted with a full range of night-vision equipment and two Bofors 71-mm (2.79-in) Lyran mortars which fire flares to provide target illumination at night.

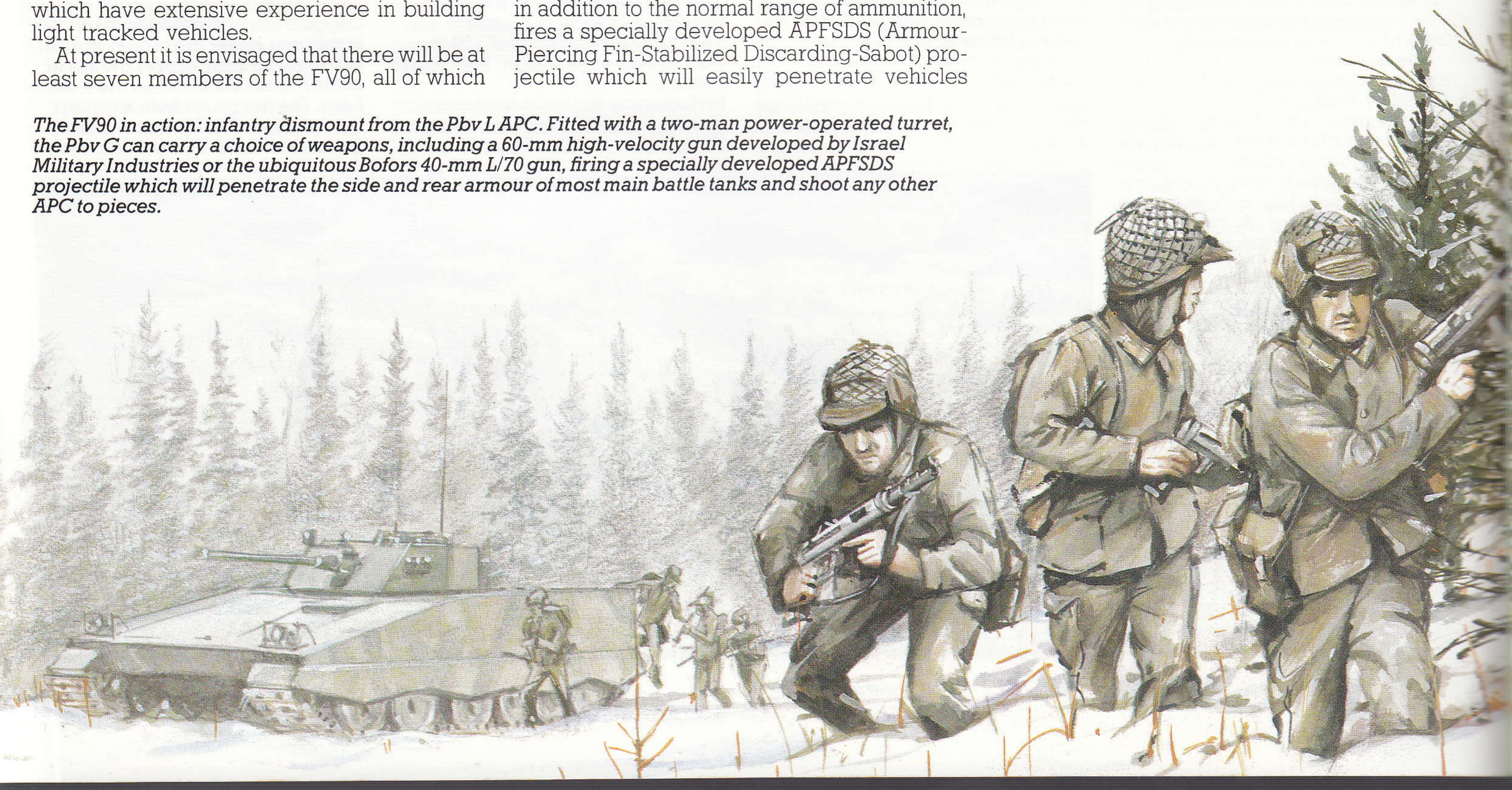
On each side of the turret will be a bank of six electrically-operated smoke-dischargers. These are used to provide a smoke screen behind which the vehicle can withdraw. In addition the dischargers can also fire grenades to decoy and confuse anti-tank guided weapons.

## Support vehicles

Low-level air defence of the Swedish army is at present carried out by towed Bofors 40-mm anti-aircraft guns and Bofors RBS-70 surface-to-air missiles, the latter in both man-portable and self-propelled configurations. But the threat from low-flying aircraft grows year by year, and the advent of the armed attack helicopter has added a new dimension to land warfare.

The Swedish army intends to counter this threat with a mix of guns and missiles, with the **Lvkv A2** system playing a key role. The vehicle will be virtually identical to the previous version (having the same hull, turret and armament) but will be optimized for the air-defence

*The FV90 in action: infantry dismount from the Pbv L APC. Fitted with a two-man power-operated turret, the Pbv G can carry a choice of weapons, including a 60-mm high-velocity gun developed by Israel Military Industries or the ubiquitous Bofors 40-mm L/70 gun, firing a specially developed APFSDS projectile which will penetrate the side and rear armour of most main battle tanks and shoot any other APC to pieces.*



role. Mounted on the turret rear will be a Swedish Ericsson 3D radar designed to detect aircraft and hovering helicopters, the latter being notably difficult to pick up. This radar was developed several years ago and has been successfully tested on the ARMAD model of the Bofors RBS-70.

The 40-mm Bofors gun can fire a variety of ammunition including pre-formed high explosive, high capacity high explosive, high explosive tracer, armour-piercing capped tracer, the new armour-piercing fin-stabilized discarding-sabot round, and target practice tracer. The first of these (pre-formed high explosive, with a proximity fuse) would normally be used in the air-defence role.

Two command and control vehicles are included in the series; the Stripv armoured command post, which will be fitted with extensive communications equipment, and the Epbv armoured observation post, which will be the eyes and ears of towed and self-propelled artillery units. To carry out its mission it will have communications equipment and sensors such as a laser rangefinder.

An armoured recovery version of the FV90 family is planned, as armoured vehicles often break down, get stuck in rough terrain, or are disabled by enemy action. Whatever the cause, such disabled vehicles have to be returned to their units as soon as possible.

Mounted at the front of this version, called the **Bgbv**, is a hydraulically-operated blade which can be used to stabilize the vehicle during lifting or recovery operations, or used as a dozer blade to clear away battlefield obstacles or to prepare fire positions. Other equipment will include a winch to recover damaged and disabled vehicles, and a hydraulic crane for changing complete powerpacks (engine, transmissison and cooling system) and other components.

## Mortar carrier

At present the 81-mm (3.2-in) and 120-mm (4.72-in) mortars used by the Swedish army are not mounted in armoured vehicles: the former is carried disassembled and the latter on a two-wheeled carriage towed behind a truck.

The installation of a 120-mm on an armoured chassis offers a number of advantages, including faster into- and out-of-action times, protection of the crew from small arms fire and shell splinters, and the ability to carry more ready-use rounds.

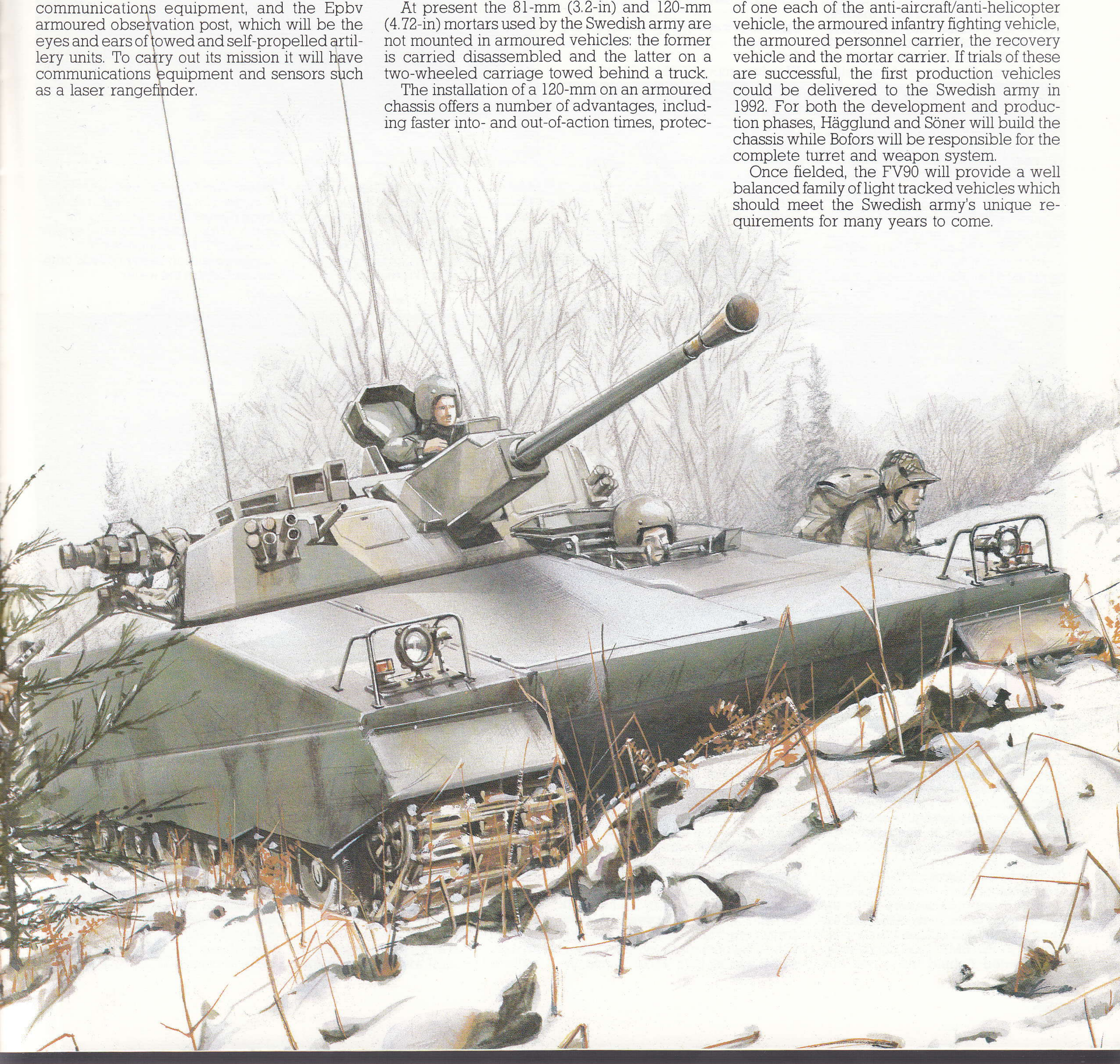
In addition to the normal high explosive and smoke bombs, the 120-mm mortar will probably fire the new FFV Strix guided mortar projectile which has been designed to attack the vulnerable upper surfaces of tanks and other armoured vehicles.

## First prototypes in 1988

By using proven components, the normal 10-year development programme has been considerably shortened and hopefully this will lead to significant cost savings.

In the summer of 1985 the Swedish army placed an order for five prototypes of FV90, and the first of these is expected to be completed in 1988. The five prototypes will consist of one each of the anti-aircraft/anti-helicopter vehicle, the armoured infantry fighting vehicle, the armoured personnel carrier, the recovery vehicle and the mortar carrier. If trials of these are successful, the first production vehicles could be delivered to the Swedish army in 1992. For both the development and production phases, Hägglund and Söner will build the chassis while Bofors will be responsible for the complete turret and weapon system.

Once fielded, the FV90 will provide a well balanced family of light tracked vehicles which should meet the Swedish army's unique requirements for many years to come.



CHINA

# Type 63 light tank

After the end of World War II the USSR supplied China with a significant amount of military equipment including T-54 MBTs and PT-76 light amphibious tanks. Further development of the latter by China resulted in the **Type 63** light tank, which has been in service with the Chinese army for many years and has seen combat in the hands not only of the Chinese army but also of the Pakistani army (against India) and of the North Vietnamese army (against South Vietnam).

In many respects the Type 63 has a number of significant improvements over the original Soviet PT-76, including a four-man crew, increased firepower and (as it has a more powerful engine) a greater power-to-weight ratio which gives much improved road and water speeds.

The hull of the Type 63 is, like that of the PT-76, very large to allow the vehicle to float without any preparation apart from erecting the trim vane at the front of the hull and switching on the bilge pumps. The Type 63 is propelled in the water at a maximum speed of 12 km/h (7.5 mph) by two water jets mounted at the rear of the vehicle.

Main armament comprises an 85-mm (3.34-in) gun which fires a variety of ammunition including armour-piercing HE, HE, HEAT and smoke; 47 rounds of ammunition are carried. A 7.62-mm (0.3-in) machine-gun (for which 1,000 rounds are carried) is mounted co-axial with the main armament, and a 12.7-mm (0.5-in) machine-gun (for which 500 rounds are carried) is mounted on the turret roof for anti-aircraft defence.

The turret and hull are of welded steel construction with a maximum thickness of 14 mm (0.55 in), which is sufficient to provide protection against small arms fire and shell splinters only. If the armour was any thicker then the vehicle would require a flotation screen to be amphibious.

Suspension is of the torsion bar type, and consists of six large rubber-tyred road wheels with the idler at the front and drive sprocket at rear; there are no track-return rollers.

In the Chinese army four Type 63 light tanks can be found in the reconnaissance platoon of each armoured regiment, while there are 10 in the reconnaissance company of each armoured division. The vehicle is also in service with Pakistan. Sudan, Tanzania and Vietnam, and is now being offered for sale to other countries.

### Specification

**Type 63**

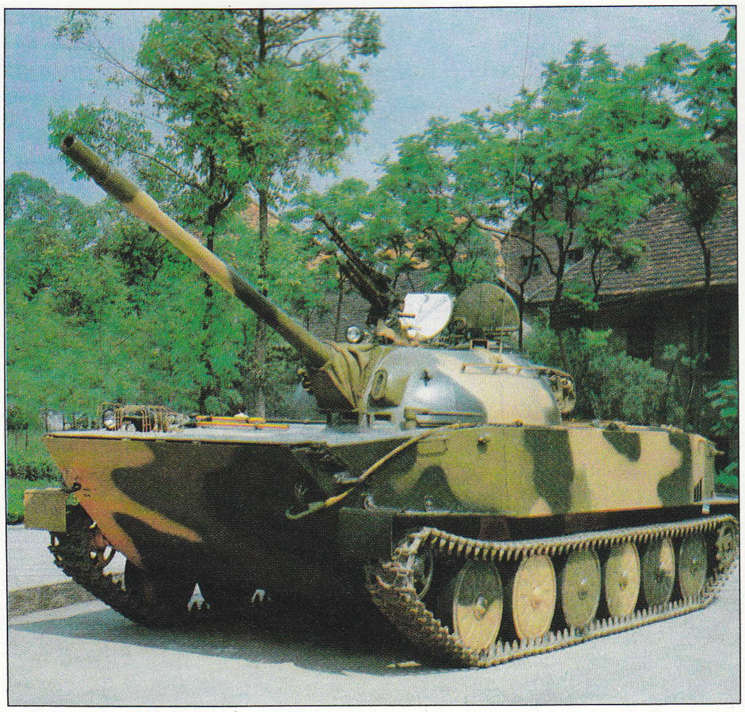
**Crew:** 4

**Weights:** empty 16700 kg (36,816 lb); loaded 18700 kg (41,226 lb)

**Powerplant:** one Type 12150-L 12-cylinder diesel developing 400 hp (299 kW)

**Dimensions:** length, gun forward 8.437 m (27 ft 8.2 in) and hull 7.125 m (23 ft 4.5 in); width 3.20 m (10 ft 6 in); height without machine-gun 2.522 m (8 ft 3.3 in)

**Performance:** maximum road speed 64 km/h (40 mph); range 370 km (230 miles); fording amphibious; vertical obstacle 0.87 m (2 ft 10 in); trench 2.9 m (9 ft 6 in); gradient 60 per cent; side slope 30 per cent



*Above: The Type 63 amphibious light tank was one of the first AFVs to be produced by China. Sharing many components with the Type 77 armoured personnel carrier, it is a development of the Soviet PT-76 and has seen action in Vietnam and Pakistan.*

*Below: The Type 63 needs only to erect its trim vane and switch on the bilge pumps before entering the water. It has a more powerful engine than the PT-76, which gives it correspondingly faster speeds both on land and in the water.*

USSR

# BMP-2 mechanized infantry combat vehicle

The **BMP-2** mechanized infantry fighting vehicle is a further development of the BMP-1 and was first observed in public during a parade held in Red Square, Moscow, late in 1982, although it entered service with the Soviet army several years before that. Since then it has also been observed in service with the Czech army.

The basic chassis of the BMP-2 is very similar to that of the original BMP-1 which entered service with the Soviet army in the early 1960s, but has a new turret and different crew positions. On the BMP-1 the commander was seated behind the driver and therefore had poor observation to the right side of the vehicle. In the BMP-2 the commander now sits in the much enlarged turret alongside the gunner, and has excellent all-round battlefield observation.

The BMP-1 is armed with a 73-mm (2.87-in) weapon that fires a fin-stabilized HEAT (High Explosive Anti-Tank) or HE-FRAG (High Explosive Fragmentation) round, with a 7.62-mm (0.3-in) co-axial machine-gun, and with a 'Sagger' wire-guided anti-tank weapon mounted above the main armament. The 73-mm gun suffered from a number of drawbacks and is ineffective in high winds, while the first-generation 'Sagger' missile needed a well-trained gunner to ensure a first-round hit.

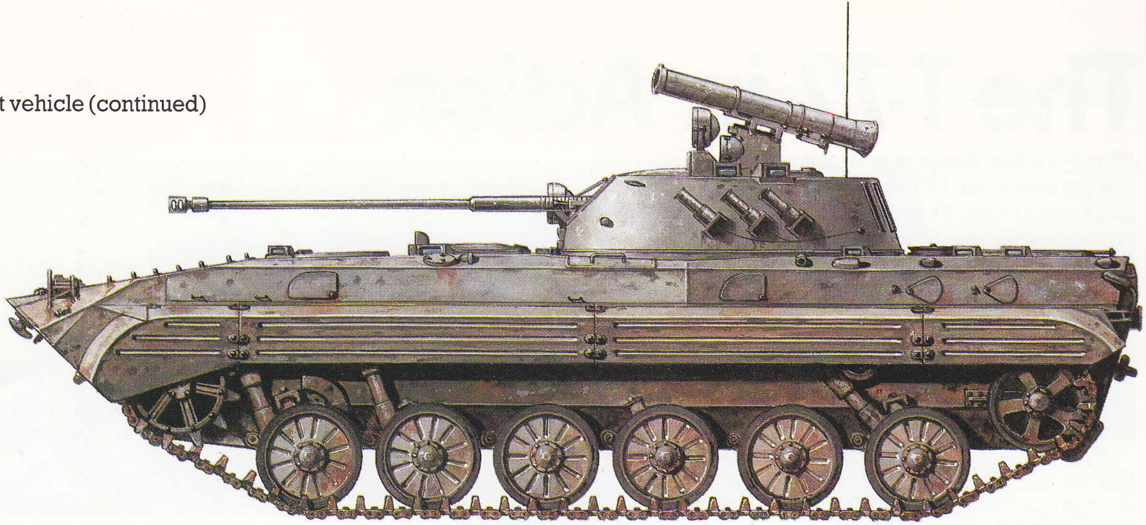
These major disadvantages have been overcome in the BMP-2, as the armament now comprises a 30-mm rapid-fire automatic cannon which can be elevated to +74°, so enabling it to be used against low-flying aircraft and helicopters. The gunner can select either single shots or one of two rates of automatic fire (200/300 or 500 rounds per minute) and 500 rounds of HE-T (High Explosive – Tracer) and AP-T (Armour-Piercing – Tracer) are carried. A 7.62-mm PKT machine-gun is mounted co-axial with the main armament.

Mounted on the turret roof is an AT-4 'Spigot' anti-tank guided weapon, which has a maximum range of 2000 m (2,187 yards) and is fitted with a HEAT warhead. All the operator has to do to ensure a hit is to keep the crosswires of his sight on the target. (On the earlier AT-3 'Sagger' he had to operate a small joystick.)

In addition to being able to inject diesel fuel into the exhaust to lay its own smoke screen, the BMP-2 has a bank of three electrically-operated smoke-dischargers mounted on each side of the turret towards the rear. More recent BMP-2s have appliqué armour on their turret sides.

Seven fully-equipped infantrymen are carried, compared with eight in the earlier vehicle: one man is seated to the rear of the commander, and the other six in the troop compartment at the rear facing outwards, each being provided with a firing port with an observation periscope above.

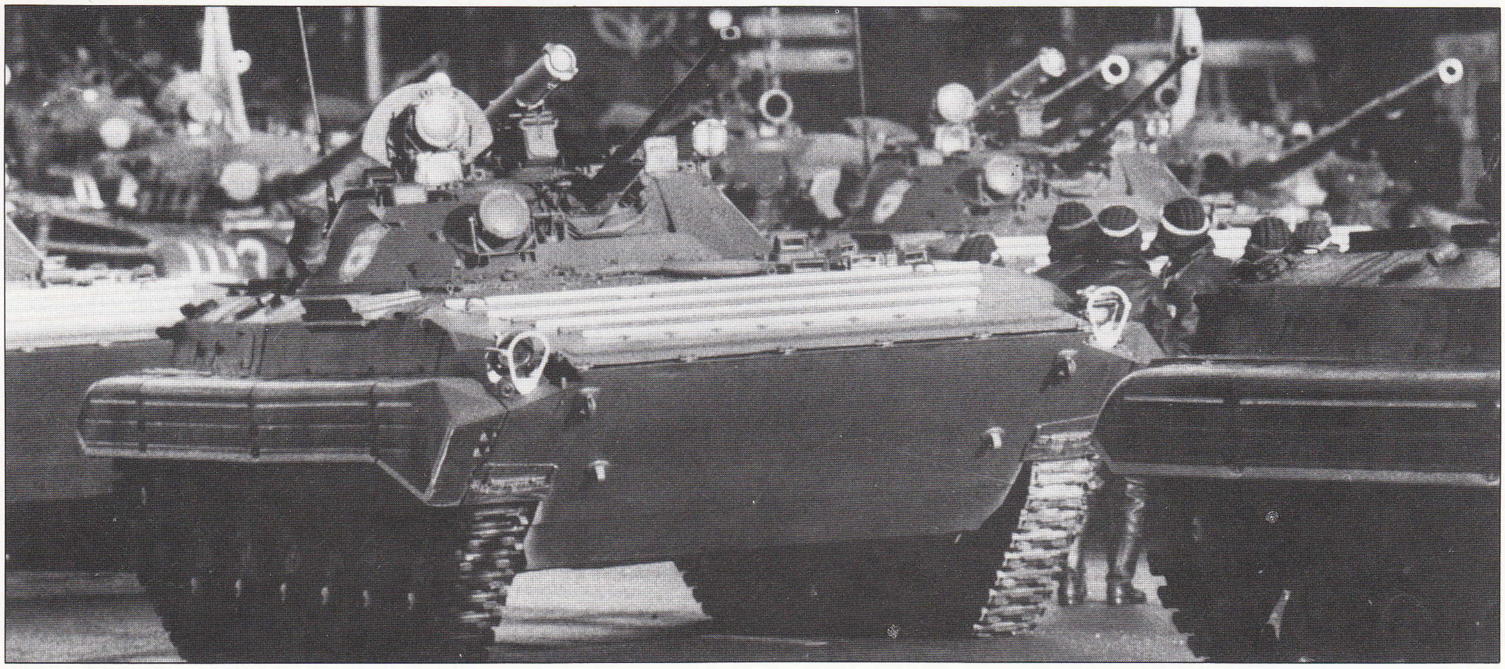
Like the BMP-1, the BMP-2 is fully amphibious, being propelled in the water by its tracks. Before entering the water a trim vane is erected at the front of the vehicle and the bilge pumps are switched on.



### Specification
**BMP-2**
**Crew:** 3+7
**Weight:** loaded 14600 kg (32,187 lb)
**Powerplant:** believed to be one Type 5D20 turbocharged 6-cylinder water-cooled diesel developing 350 hp (261 kW)
**Dimensions:** length 6.71 m (22 ft 0.2 in); width 3.09 m (10 ft 1.7 in); height 2.06 m (6 ft 9 in)
**Performance:** maximum road speed 60 km/h (37.3 mph); range 500 km (311 miles); fording amphibious; vertical obstacle 0.7 m (2 ft 3 in); trench 2.0 m (6 ft 7 in); gradient 60 per cent; side slope 30 per cent

*Above: The BMP-2 is a new version of the BMP Mechanized Infantry Combat Vehicle, and substitutes a 30-mm cannon for the 73-mm smooth bore gun of the first model. It also carries AT-4 'Spigot' ATGMs in place of outdated AT-3 'Sagger' missiles.*

*Below: Like most Soviet AFVs, the BMP-2 is able to lay a smokescreen by injecting diesel fuel directly into the exhaust, but it also carries a bank of electrically operated smoke dischargers on the turret sides. Some BMP-2s have been sporting appliqué armour on their sides.*



USSR

## T-72 main battle tank

For many years there has been much confusion in the West as to exactly which main battle tanks the USSR has produced in quantity in recent years. This problem has been compounded by the fact that different countries give different designations to the same vehicle.

From recent information it appears that the USSR has mass produced two MBTs in the last 15 years. The T-64 entered production in 1967 and remained in production until 1981. This was built in fairly large numbers, but so far has been identified in service only with the Soviet army. The basic tank has the same armament as the later T-72 and is fed by an automatic loader, so enabling the crew to be reduced to just three men (commander, gunner and driver). From most reports there were many problems with the T-64 once it reached the troops, especially with the engine, transmission, suspension and automatic loader. In addition to the basic gun tank there is a version, the T-64B, that fires a 'Cobra' guided missile in the long-range anti-tank role.

The **T-72** MBT entered production in 1971, and in 1986 was being produced in at least three plants in the USSR as well as in Czechoslovakia and Poland. Production of modified versions is also being undertaken in India and Yugoslavia.

The T-72 and its later variants have now been identified in service with Algeria, Bulgaria, Cuba, Czechoslovakia, East Germany, Hungary, India, Iraq, Libya, Poland, Romania, Syria, the USSR and Yugoslavia. Finland is expected to take delivery of its vehicles in the near future.

The 125-mm (4.92-in) gun is fed by an automatic loader which first inserts the projectile and then the charge into the breech. Three types of ammunition are carried: APDSDS (Armour-Piercing Fin-Stabilized Discarding-Sabot), HEAT – FS (High Explosive Anti-Tank – Fin-Stabilized), HE-FRAG (FS) (High Explosive-Fragmentaion Fin-Stabilized). A 7.62-mm (0.3-in) machine-gun is mounted co-axial with the main armament, and a 12.7-mm (0.5-in) machine-gun is mounted on the commander's cupola. Like other Soviet armoured vehicles, the T-72 can lay its own smoke screen by injecting diesel fuel into the exhaust.

Since the T-72 first appeared a number of improvements have been carried out, including the installation of a laser rangefinder, additional armour protection, smoke grenade launchers on each side of the turret and so on. The late production T-72 is known as the **T-74** in the USSR, although the USA calls it the **T-80**.

The area of greatest confusion on the T-72/T-74 is its armour. It is assumed that the hull front is of a laminate armour, but it is believed that the turret is of conventional armour.

Variants of the T-72 include a command vehicle, another firing the 'Cobra' anti-tank missile and the **BREM-1** armoured recovery vehicle.

### Specification
**T-72**
**Crew:** 3
**Weights:** empty 39000 kg (85,979 lb); loaded 41000 kg (90,388 lb)
**Powerplant:** one V-12 diesel developing 780 hp (582 kW)
**Dimensions:** length, gun forward 9.24 m (30 ft 3.8 in) and hull 6.95 m (22 ft 9.6 in); width without skirts 3.60 m (11 ft 9.7 in); height with machine-gun 2.37 m (7 ft 9.3 in)
**Performance:** maximum road speed 60 km/h (37 mph); range 480 km (298 miles); fording 1.4 m (4 ft 7 in); vertical obstacle 0.85 m (2 ft 10 in); trench 2.8 m (9 ft 2 in); gradient 60 per cent; side slope 40 per cent

# The T-72 in Action

*The T-72 has been in service with the Soviet army for 15 years, but many important details of its construction remain obscure to Western analysts. Even if one is captured, perhaps during the next war in the Middle East, there is no guarantee the mystery will end.*

*With its automatic loader and laser rangefinder, the T-72 undermined NATO's cosy belief in the qualitative superiority of its armour. The T-72 was probably already in service by 1975 but more details have only just emerged. It is widely assumed that exported T-72s are not as advanced as those used by the Red Army.*

Although the T-72 MBT entered service with the Soviet army as far back as 1971 there is still a shroud of mystery surrounding many aspects of the vehicle and its numerous variants.

As far as it is known no example of the T-72 has yet fallen into Western or Israeli hands to enable a detailed technical examination of the vehicle to be carried out.

In addition to being in service with the Warsaw Pact it has also been identified as being in service with Algeria, Cuba, India, Iraq, Libya, Syria and Yugoslavia. As well as being produced at three plants in the USSR, the T-72 is also produced under licence in Czechoslovakia, Poland, India and Yugoslavia.

In the past vehicles of Soviet design which have been produced for the export market have often been less sophisticated in key areas (for example armour protection and fire control) and those used by members of the Warsaw Pact.

While detailed specifications of the T-72 such as weight, performance and dimensions are accurately known, the one area of concern to NATO is the thickness and type of armour fitted to the vehicle. This information is of crucial importance to the designers of ammunition and anti-tank guided weapons in order that they can design weapons to defeat this armour.

Throughout the 1960s and 1970s no tank in the world was safe from penetration from anti-tank guided weapons fitted with a HEAT (High Explosive Anti-Tank) warhead: the Euromissile Milan, for example, can penetrate some 700 mm (27.56 in) of armour.

The effect of HEAT warheads, which are fitted to every type of anti-tank guided missile in service in the world today and are fitted to some anti-tank rounds fired by tank guns installed in MBTs such as the T-72, T-62, T-55, M1, Leopard 2, Leopard 1 and so on, can be significantly downgraded by careful design of the vehicle, such as well sloped frontal armour, and by installation of spaced armour which detonates the HEAT warhead away from the main armour of the tank. The effects of HEAT warhead can be eliminated by the installation of reactive armour or advanced composite (laminate) armour such as that known to be employed over the frontal hull and turrets of modern Western tanks, for example, the Challenger, Leopard 2 and M1/M1A1.

Reactive armour (such as the Israeli Blazer) can be installed on existing tanks (for example many Israeli M48, M60 and Centurion series vehicles) but this can provide protection only against HEAT attack, not kinetic-energy rounds such as APDS (Armour-Piercing Discarding-Sabot) or APFSDS (Armour-Piercing Fin-Stabilized Discarding-Sabot). Laminate armour provides protection against both HEAT and APDS/APFSDS attack over the vulnerable frontal area.

The development of these new armours has led to the development of new and more powerful HEAT warheads for Western Milan, HOT and TOW anti-tank guided missiles, but as no known examples of T-72s have been captured the effectiveness of these missiles is still an unknown factor. Even if, for example, a T-72 was captured in the Middle East and examined in detail by Western intelligence, there is no guarantee that this would have the same type of armour as T-72s used by the Warsaw Pact.

Details of the 125-mm (4.92-in) gun of the T-72 and its unique automatic loader have been described in some detail in Soviet military publications, although details of the crucial fire-control system required to obtain a first round hit are still lacking.

First models of the T-62 had an optical rangefinder but latest production models are believed to have a laser rangefinder which is far more accurate, especially at longer ranges.

First vehicles were fitted with infra-red night-vision equipment but it can be assumed that passive or perhaps thermal night-vision equipment will soon be introduced to enhance the combat capability of the T-72. The introduction of thermal gunnery equipment would enable the T-72 to engage targets not only by night but also in poor weather conditions, and even to see through trees and bushes.

The latest version of the T-72, called the T-74 in Europe but T-80 in the USA, has a modified fire-control system as well as a number of other improvements including forward-firing smoke-dischargers, improved armour and more external stowage.

The T-72 was preceded by the T-64. This has been identified in service only with the Soviet army, and has never been deployed outside the Warsaw Pact. Although the tank entered service almost 20 years ago, it is still very much a mystery vehicle and has never appeared on any of the parades held in Red Square, Moscow.

## Unreliability in service

Like the T-72, the T-64 has a 125-mm smoothbore gun fed by an automatic loader, but it has not proved to be a very reliable tank in service and there have been many reports of problems with the engine, transmission and suspension.

In addition to the basic T-64 MBT, there was also the T-64B which although similar in appearance to the T-64A, fired Cobra anti-tank guided missiles from its gun tube in addition to the normal types of ammunition.

It is assumed that the T-64B fulfilled a similar role to that of the US M60A2 MBT, now withdrawn from service. This was armed with a 152-mm (6-in) weapon which could fire either the Shillelagh guided missile or conventional

*The T-72's turret is smaller and lower than that of the T-62 because it has to fit only two men, the tank commander and the gunner. The glacis slope is noticeably more pronounced and, even if the Soviets have not developed an effective composite armour, this will improve protection.*

*The T-72 has a dozer blade under its nose for clearing obstacles and preparing fire positions. This East German T-72 is carrying KMT-5 mine-clearing equipment.*

round with a combustible cartridge case. The object of the M60A2 was to give long-range fire support to the M60 and M60A1 tanks armed with the standard 105-mm (4.13-in) rifled tank guns. The main drawbacks of the Shillelagh weapon system, which in a slightly different form was also fitted to the M551 Sheridan light tank, were its slow rate of fire, and the excessive amount of training and maintenance required to keep the system effective.

The slow rate of fire of the Shillelagh missile was caused by the fact that the gunner had to keep his sights on the target until the missile impacted. The launcher could then be reloaded and another target engaged.

Recent combat experience has shown that the vast majority of tank engagements in any future conflict will take place at very short ranges, often less than 1000 m (1,094 yards). The rapid urbanization of Western Europe has meant that in many parts of West Germany it will be impossible to engage tanks beyond this range because of obstructions. For this reason it is difficult to see why the T-64B was fielded, unless it was simply a response to the introduction of the US M60A2. Some sources state that the new Soviet MBT is fitted with a similar weapon to the T-64B, but perhaps with a fire-and-forget capability which would make it a much more effective weapon as well as having a higher rate of fire.

## Soviet divisions strengthened

Not only has the USSR introduced new armoured fighting vehicles such as the T-72 MBT, BMP-2 mechanized infantry combat vehicle, new mobile air-defence systems (gun and missile) and a whole range of self-propelled guns and howitzers, but the number of tanks in the tank division has been increased to no less than 328 and in the motorized rifle division to 220.

Towed guns and howitzers in the divisions have given way to self-propelled weapons which not only have greater cross-country mobility, so enabling them to keep up with mechanized units, but which can also operate in an NBC environment and have higher rates of fire.

Since well before World War II Soviet tactics have emphasized offensive operations at all times, with defensive tactics used only as a preliminary to a resumed offensive.

Types of Soviet offensive action include the well-known meeting engagement, the breakthrough attack and pursuit.

Over the last 15 or 20 years the Soviet army has been placing increasing emphasis on military operations that penetrate deep into enemy territory, covering much greater distances than those accomplished by normal first-echelon units.

Airborne or air assault units would be used to knock out allied airfields, communications centres, tactical nuclear weapon storage and firing positions, fuel and ammunition dumps, stockpiles or reserve vehicles and so on. Ports and airfields allocated for use by US reinforcement units would also be priority targets as these play a vital role in NATO's defensive plans. Soviet Spetsnaz special forces, the equivalent of the British Special Air Service (SAS), whose strength is believed to consist of 16 brigades each with three regiments, would also be used well behind NATO lines and on the flanks of NATO.

This would force NATO commanders to take away front-line units or use essential reserve units to police the rear areas. Some NATO countries, such as West Germany and the UK, have already allocated reserve units just to defend key rear areas.

## Operational Manoeuvre Group

One of the latest Soviet concepts, although its origins can be traced back to World War II, is the Operational Manoeuvre Group (OMG).

The size of an OMG would depend on its mission, but typically would consist of a tank or motorized rifle division with additional elements attached, not only to increase its firepower (for example artillery and multiple rocket launchers) but also have greater engineer assets (to overcome obstacles such as rivers and anti-tank defences), attack helicopters and massive air support. Maintenance and repair of damaged and disabled vehicles would also have high priority.

The OMG may operate on one axis or be split into two complete units, and is designed to punch through any weak point in the allied defence found by the first echelon.

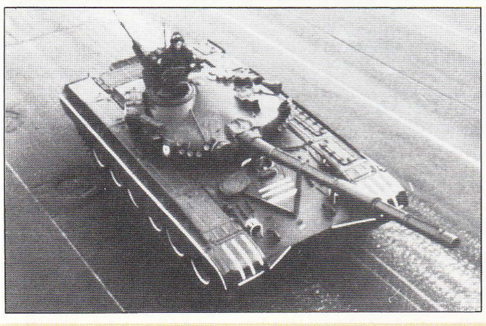
Once through allied first-line defences the OMG, which would be fresh and have no losses of men or equipment, would have a number of missions; for example, stopping allied reinforcements reaching the front line, preventing the retreat to new positions by allied units, and seizing key objectives such as river crossing points and intersections of major rail or road communication systems.

The OMG would be under the personal control of the Front commander at all times, and once committed would have fairly defined objectives.

The Soviet Front commander would still control his normal units. A Soviet Front size depends on its missions and position but typically consists of three or four combined-arms armies and one or two tank armies, plus many supporting brigades, battalions and regiments.

The object of the OMG would be to penetrate as far into allied territory and to cause as much damage and confusion as possible. A much larger force, perhaps consisting of an army-size OMG, would follow with the object of penetrating deeper into the rear areas, so causing the collapse of whole allied units.

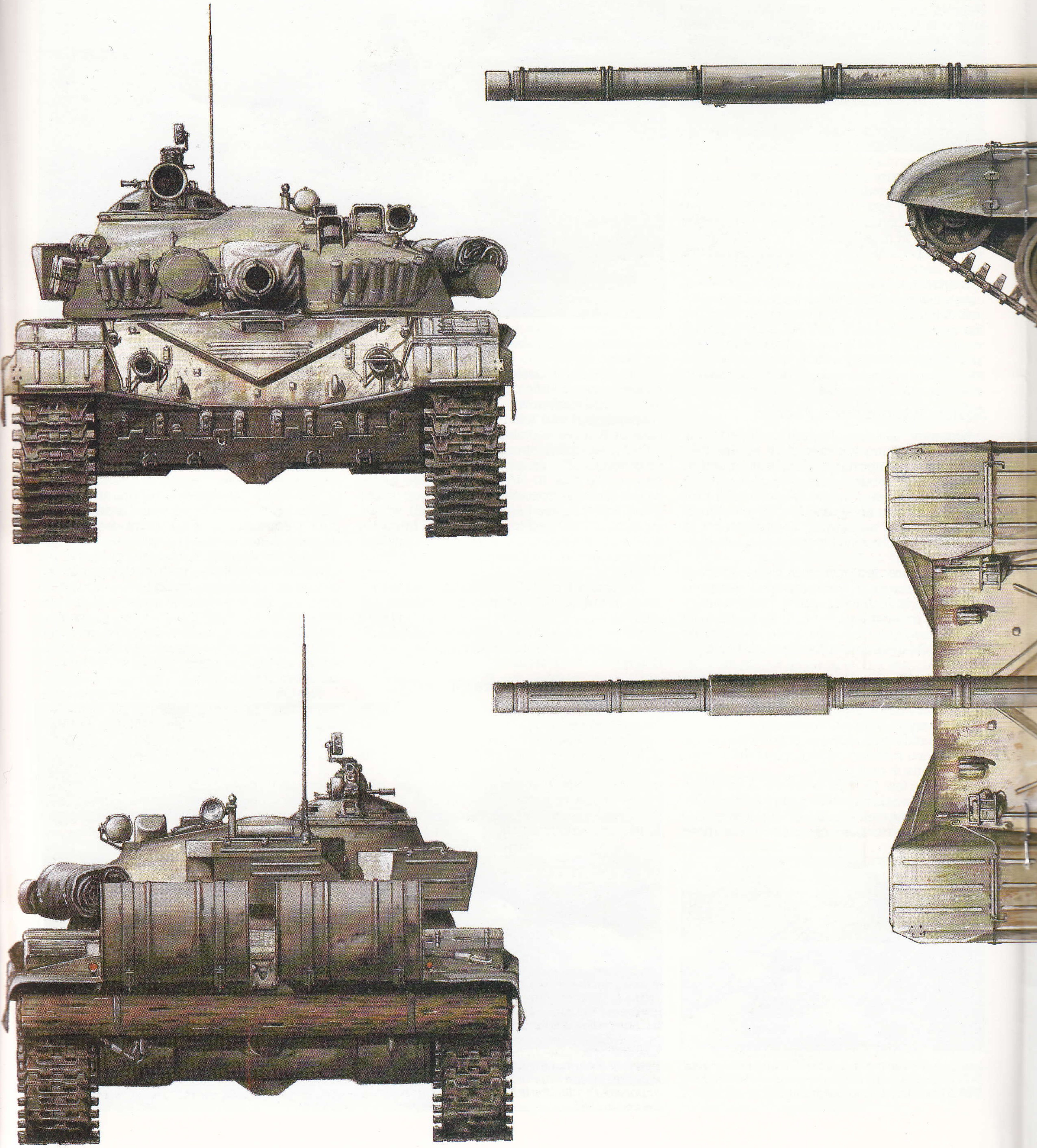
At present NATO hopes to slow down any Warsaw Pact advance into its territory and channel enemy units into killing zones for tanks, anti-tank guided weapons and artillery. Nuclear weapons will only be used after the NATO allies have consulted with each other, and this takes time. If the Warsaw Pact forces had penetrated far into Western Germany, for example, and were actually among NATO units, then the use of nuclear weapons would be impossible.

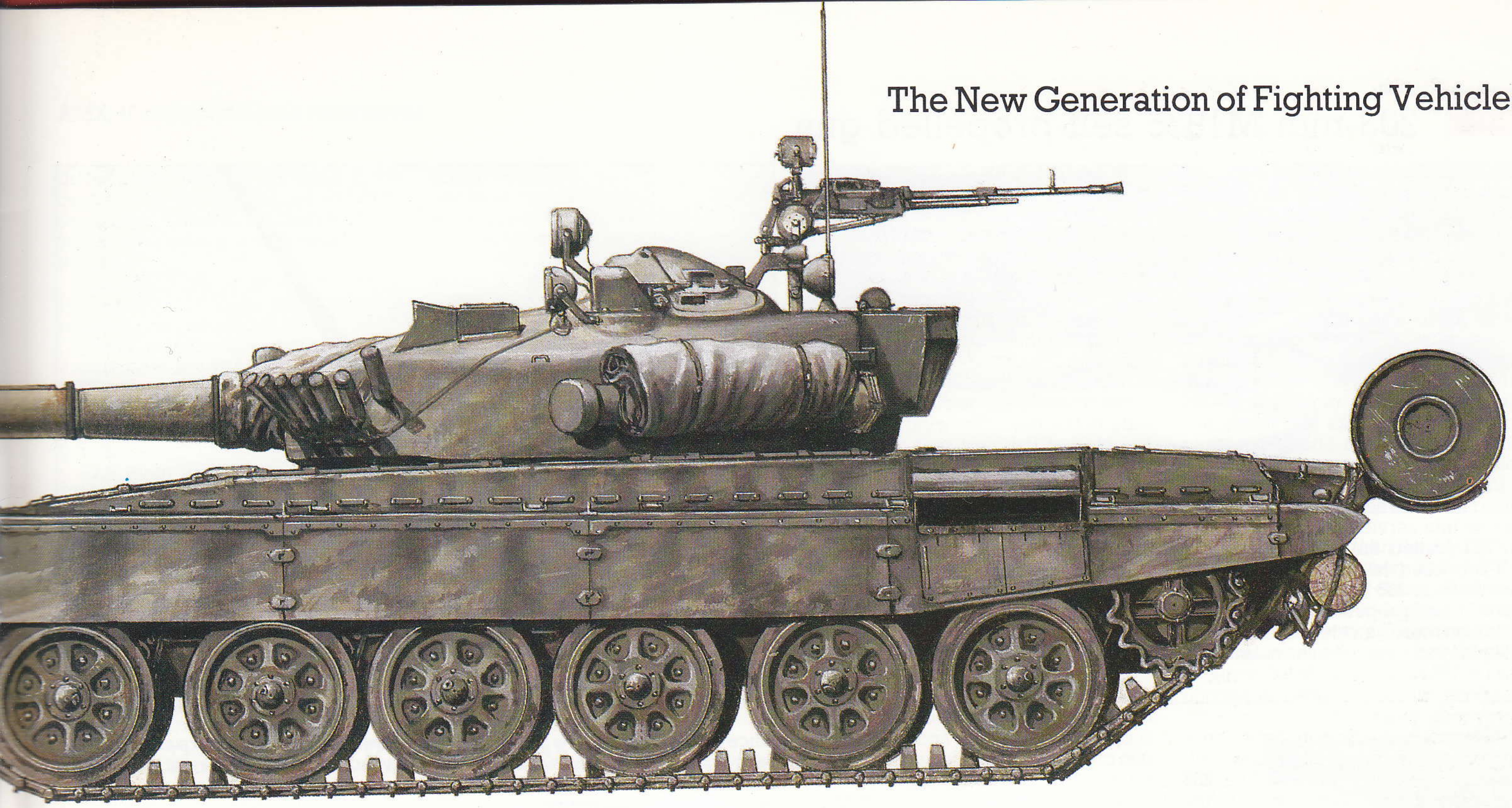


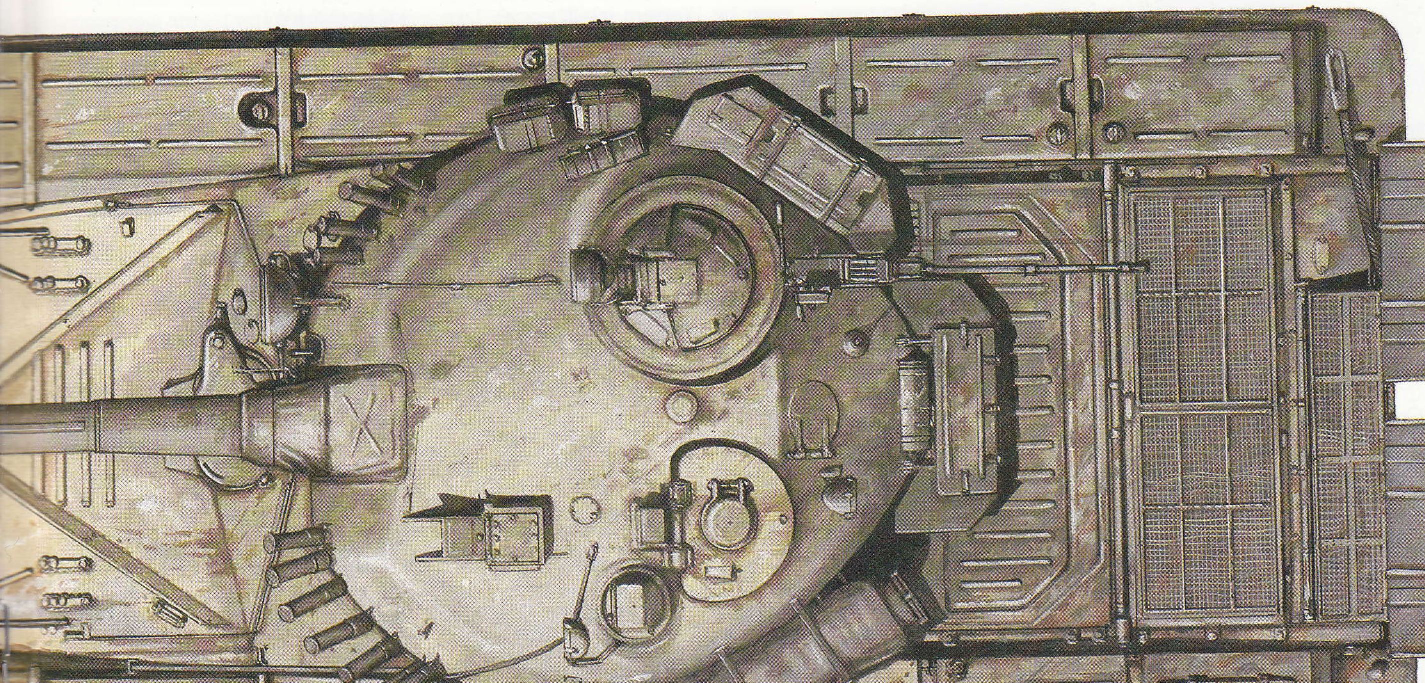
*Late production models of the T-72 are designated T-74 in the Soviet Union, but are called T-80 in the USA. They carry a laser rangefinder.*

*Possibly designed in parallel with the T-72 by a different design bureau, the T-64 has still not been exported. Production is believed to have finally ceased in 1981.*

# T-72 M1980/1







*This improved model of the T-72 was first observed at a parade in Berlin in 1981, and it subsequently appeared at the November Parade in Moscow. Early T-72s had a pronounced hood in front of the right-hand (commander's) cupola; the absence of this on the latest model indicates that optical equipment has been replaced by a laser rangefinder. The full details of the construction of the T-72 will not be revealed until several examples of the tank have been brought to the West intact, for example after Syrian T-72s have been overrun by the Israelis. However, the controversy might not end there, as the Soviets often remove some of the more sensitive equipment from tanks or aircraft which are intended for export; these are referred to as 'monkey models' in Soviet jargon. Soviet T-72s are known to be very well protected from nuclear contamination, carrying a skin layer of a lead-based foam; this lining is not fitted to exported T-72s. It is also to be expected that the fire control systems and possibly the automatic loaders are different in Soviet and export T-72s.*

USSR

# 203-mm M1975 self-propelled gun

Apart from self-propelled anti-tank guns such as the ASU-57 and ASU-85 developed specifically for use by the airborne forces, the Soviet army in the post-war period has relied on artillery towed by full-tracked prime movers or by 6×6 trucks to provide fire support for its mechanized units.

The various Middle East conflicts clearly showed, however, that towed artillery cannot hope to keep up with mechanized forces moving at speed across country, tanks and troop carriers in these wars often outrunning their support artillery.

In the early 1970s the Soviets thus introduced two self-propelled artillery pieces into service, the 122-mm (4.8-in) **2S1** (called the **M1974** in NATO) self-propelled howitzer and the 152-mm (5.98-in) **2S3** (called the **M1973** in NATO) self-propelled gun/howitzer. Although these vehicles have different hulls they are very similar in layout to the US 155-mm (6.1-in) M109 series of weapons, which has been in service for over 25 years.

Since then the Soviets have introduced at least three other new self-propelled artillery pieces. The **2S5** 152-mm self-propelled gun was first seen in the late 1970s and is believed to consist of the chassis of the GMZ minelayer with a long-barrelled 152-mm weapons mounted at the rear. No protection is provided for the crew against shell fragments. The ordnance is believed to fire a standard HE projectile to a range of 27000 m (29,530 yards) or a rocket-assisted projectile to a range of perhaps 37000 m (40,465 yards). It also has a nuclear capability.

In the mid-1970s the Soviet army introduced a 203-mm (8-in) self-propelled howitzer which has been given the NATO designation **M1975** in the usual absence of any official Soviet designation. The M1975 is believed to be employed at front level, and has the distinction of being the largest armoured vehicle in service at the present time.

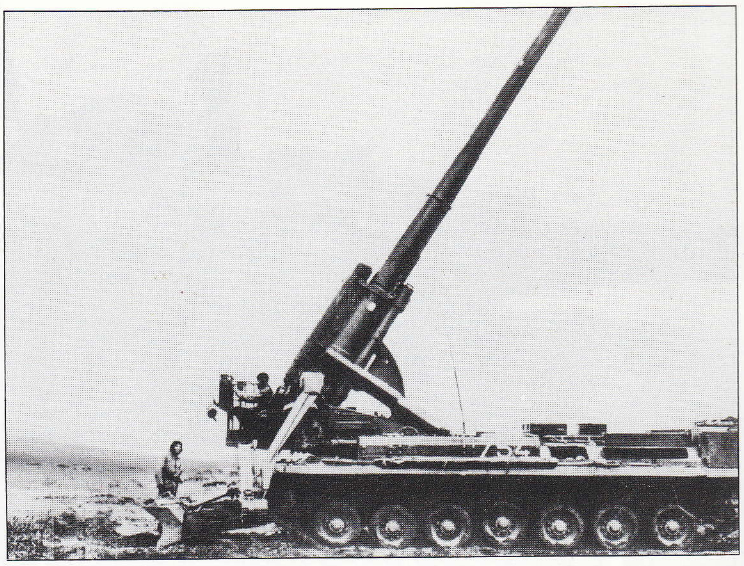
The fully enclosed armoured cab is at the front of the vehicle, with the engine to the rear. The weapon itself is mounted at the very rear of the hull, and when travelling is held in position by a lock above the cab roof. Before the weapon can be fired a large hydraulically-operated blade is lowered at the rear of the hull to provide a more stable firing platform, and mounted on the right side of the chassis is a hydraulic loading system to help lift the heavy projectiles and charges into the breech.

It is probable that a few rounds of ready-use ammunition are carried on the actual vehicle, though the main supply of ammunition and most of the gun crew are carried in another tracked and armoured supporting vehicle.

Like the 2S5, the M1975 suffers from one major disadvantage: there is no protection for the gun crew when the vehicle is in action.

No firm details of the types of ammunition fired by the M1975 are yet available, but it is likely that the weapon has both nuclear and conventional capabilities, and it is generally comparable to the American M110/M110A1/M110A2 self-propelled howitzers that have been in service for many years.

Also introduced in the mid-1970s was a 240-mm (9.45-in) self-propelled mortar which has also been called the M1975 (this being the year it was first seen by Western intelligence). Like the 203-mm M1975 self-propelled gun, it has yet to make a public appearance and no firm details are available.



***Since the early 1970s the Soviets have been manufacturing an expanding range of self-propelled artillery which now includes the massive M1975 203-mm weapon, the world's largest AFV. It is assumed to fire nuclear as well as conventional ammunition.***

**Specification** (provisional)
M1975
**Weights:** empty 37000 kg (81,570 lb); loaded 40000 kg (88,183 lb)
**Powerplant:** one diesel developing 450 hp (336 kW)
**Dimensions:** length, with gun 12.80 m (42 ft 0 in) and hull 10.50 m (34 ft 5.4 in); width 3.50 m (11 ft 5.8 in); height 3.50 m (11 ft 5.8 in)

FRANCE

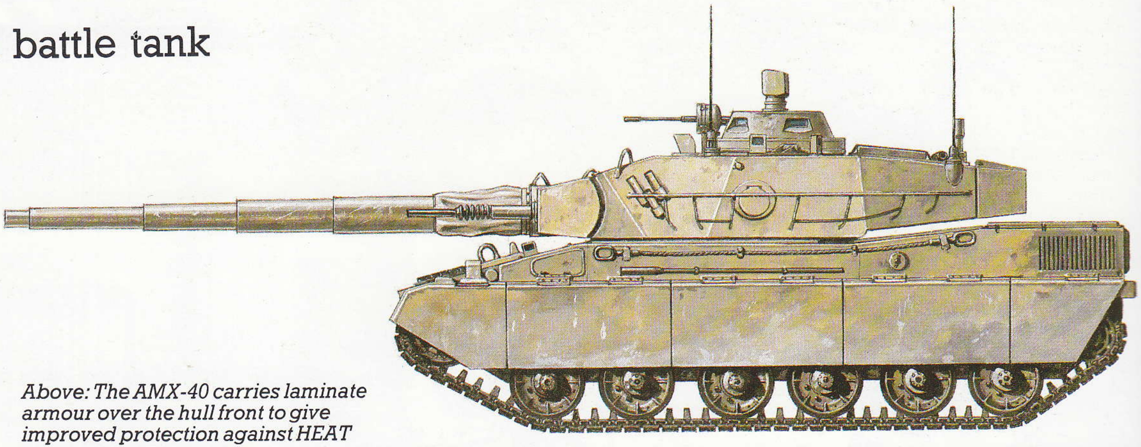
# AMX-40 main battle tank

Unlike West Germany, the UK and the USA, France has not developed a second-generation MBT such as the Leopard 2, Challenger or M1/M1A1. The standard French army MBT is still the AMX-30, whose design can be traced back to the late 1950s. This is now being modernized until the new French army MBT, the so called Engin Principal de Combat (recently renamed the Futur Char, or future tank) enters production.

GIAT realized that there would be a big gap between the end of AMX-30 production and the beginning of EPC production, so a decision was taken to build a new MBT specifically for the export market.

The first tank built was the so called AMX-32, which was based on the AMX-30 but fitted with a 120-mm (4.72-in) gun, new armour, improved fire-control system and some automotive improvements. Its crucial power-to-weight ratio was below that of the AMX-30, however, and the AMX-32 has not been sold. It is now offered only with the standard 105-mm (4.13-in) gun as installed in the AMX-30.

In 1983 GIAT unveiled the **AMX-40** MBT, which is a brand new design and has significant improvements over the earlier AMX-30 in the three key areas of tank design: armour, mobility and firepower. The AMX-40 has been designed specifically for the export market and by early 1986 four prototypes had been completed and one of these is believed to have been tested in the Middle East. The AMX-40 has also been offered to the Spanish army, which has a requirement for new MBT with a 120-mm gun.



***Above: The AMX-40 carries laminate armour over the hull front to give improved protection against HEAT ammunition. It carries its ammunition in the turret bustle, which, if penetrated, will explode upwards and away from the crew compartment.***

***Right: The French army is still stuck with a first-generation tank, the AMX-30, and the promised 'future tank' is still a long way off. GIAT has developed a much-improved MBT for the export market, the AMX-40, which is armed with a 120-mm smooth-bore gun.***

The armour over the frontal part is of the laminate type and provides protection against HEAT (High Explosive Anti-Tank) rounds with a calibre of up to 100 m (3.94 in).

The layout of the AMX-40 is similar to that of other French MBTs, with the driver at the front left, the turret in the centre (with the commander and gunner on the right and the loader on the left) and the engine and transmission at the rear.

The AMX-40 is powered by a Poyaud diesel engine which gives a power-to-weight ratio of around 25 hp (18.6 kW) per tonne, a very significant improvement over current French MBTs. The engine is coupled to a West German ZF automatic transmission for ease of handling and reduced driver fatigue.

The main armament comprises a 120-mm smoothbore gun which fires ammunition with combustible cartridge case. Ammunition stowed in the turret bustle is separated from the crew compartment by bulkheads and if a round penetrates the turret bustle the force of the exploding ammunition is vented upward rather than into the crew compartment.

Mounted co-axially with the main armament is a 20-mm cannon for dealing with lightly armoured targets, while mounted on the commander's cupola is a 7.62-mm machine-gun which can be aimed and fired from within the safety of the tank.

The integrated fire-control system includes a laser rangefinder and low-light-level TV with screens at both the commander's and gunner's positions. The commander also has a roof-mounted SFIM stabilized sight, which enables him to aim and fire the main armament.

### Specification
**AMX-40**

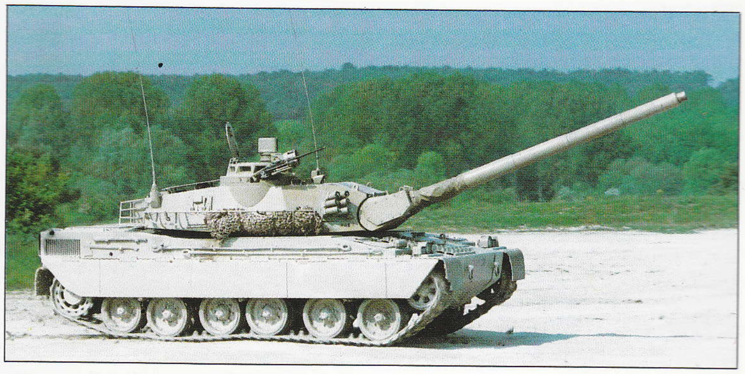
**Crew:** 4

**Weights:** empty 41000 kg (90,388 lb); loaded 43000 kg (94,798 lb)

**Powerplant:** one Poyaud 12-cylinder diesel developing 1,100 hp (820 kW)

**Dimensions:** length, gun forward 10.04 m (32 ft 11.3 in) and hull 6.80 m (22 ft 3.7 in); width 3.36 m (11 ft 0.3 in); height overall 3.08 m (10 ft 1.3 in)

**Performance:** maximum road speed 70 km/h (44 mph); range 600 km (373 miles); fording 1.30 m (4 ft 3 in); vertical obstacle 1 m (6 ft 7 in); trench 3.20 m (10 ft 6 in); gradient 70 per cent; side slope 30 per cent



*Although heavier than the AMX-30, the AMX-40 is still a very agile MBT thanks to its Poyaud diesel engine, which gives a power-to-weight ratio of 18.6 kW per tonne. Its automatic transmission reduces driver fatigue.*

FRANCE

## Panhard VBL scout car

Some years ago the French army issued a requirement for a small, light and fast armoured vehicle which would be able to carry out two basic roles on the battlefield: anti-tank armed with the Euromissile Milan anti-tank guided weapon, and reconnaissance/scout armed with machine-guns. Five manufacturers submitted designs for this competition, and Panhard and Renault were each awarded a contract to deliver three prototypes for trials with the French army.

Following these trials the Panhard VBL (Véhicule Blindé Leger) was accepted for service although no immediate production order was placed because of a shortage of funding. The total French army requirement is for a total of 3,000 vehicles (1,000 in the anti-tank role and the remaining 2,000 in the scout/reconnaissance role).

Panhard was convinced that its design would win the French army competition, so it built additional prototypes with its own funds and embarked on an intensive overseas marketing drive which involved the despatch of vehicles to many parts of the world. This marketing effort was successful to the extent that Mexico placed an order for 40 VBLs in 1984, an these had all been delivered by late 1985. Of these 40 vehicles, 32 were armed with machine-guns and the remaining eight with Milan anti-tank guided weapons.

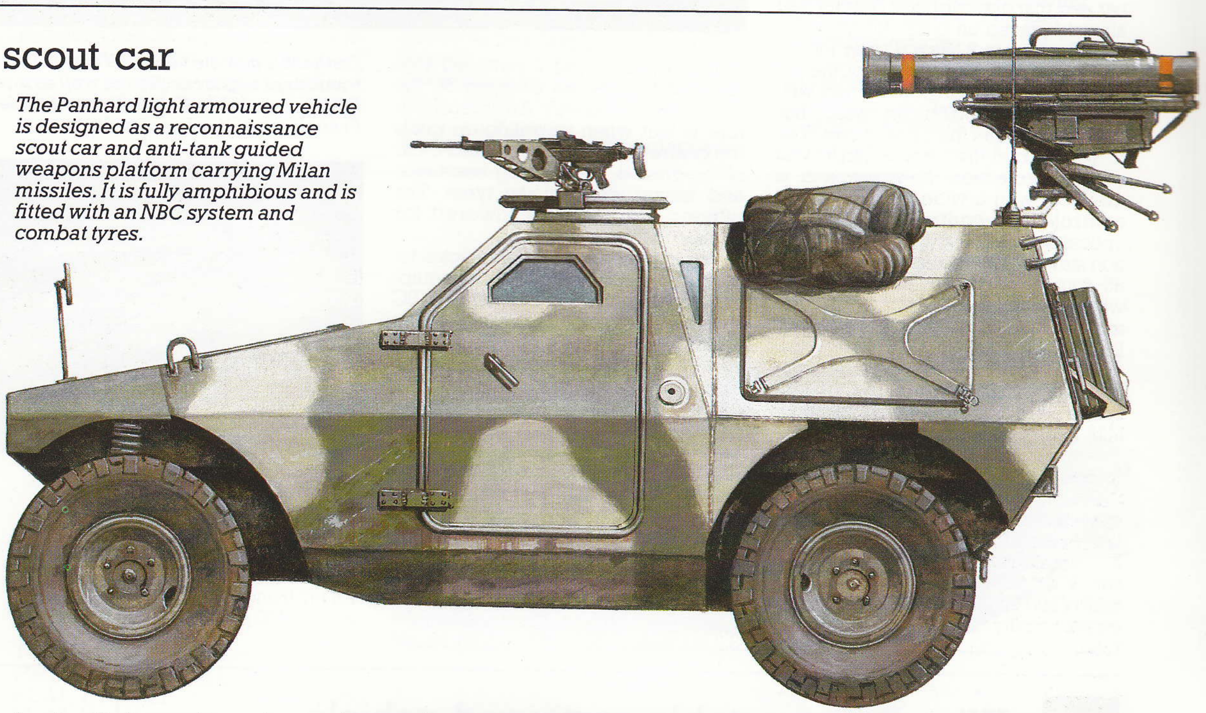
The hull of the Panhard VBL is of all-welded steel armour and provides the crew with protection from small arms fire and shell splinters. The small size and rapid acceleration of the vehicle also increases its survivability on the battlefield.

To reduce both initial procurement costs and life cycle costs, proven commercial automotive parts have been used in the design of the VBL: for example, the diesel engine is from the Peugeot 505 and 605 civilian cars and the Peugeot P4 4×4 light vehicle already entering service with the French army in significant numbers as the replacement for the Hotchkiss M201 jeep, while the West German ZF fully automatic transmission is used in many civilian cars.

The layout of the vehicle is conventional, with the engine and transmission at the front, the driver and commander in the centre, and space for a third man, weapons or other specialized equipment in the rear. Bulletproof windows (providing the same degree of protection as the hull) are provided for all crew members, and standard equipment on French army vehicles will include an NBC system, heater and communications equipment. The combat tyres allow the VBL to travel a distance of 50 km (31 mph) at a speed of 30 km/h (19 mph) after they have been damaged by enemy fire.

The vehicle is fully amphibious with very little preparation, and is moved in the water by a propeller at the rear of the hull.

The anti-tank model has a three-man crew and is armed with a Milan anti-tank guided missile launcher with six missiles and a 7.62-mm (0.3-in) machine-gun with 3,000 rounds of ammunition. The scout model normally has additional communications equipment, a two-man crew and armament comprising a 7.62 mm or 12.7-mm (0.5-in) machine-gun.



*The Panhard light armoured vehicle is designed as a reconnaissance scout car and anti-tank guided weapons platform carrying Milan missiles. It is fully amphibious and is fitted with an NBC system and combat tyres.*

*The Panhard VBL has a propeller at the rear of the hull and needs little preparation to enter the water. Many proven commercial automative parts are used in the VBL, including the engine from the Peugeot 505 civilian car.*

Panhard is already proposing a wide range of variants of the VBL including a police/internal security version, a battlefield model carrying various surveillance or air-defence radars, and an AA vehicle armed with surface-to-air missiles.

### Specification
**VBL**

**Crew:** 2 or 3

**Weights:** empty 2850 kg (6,283 lb); loaded 3550 kg (7,826 lb)

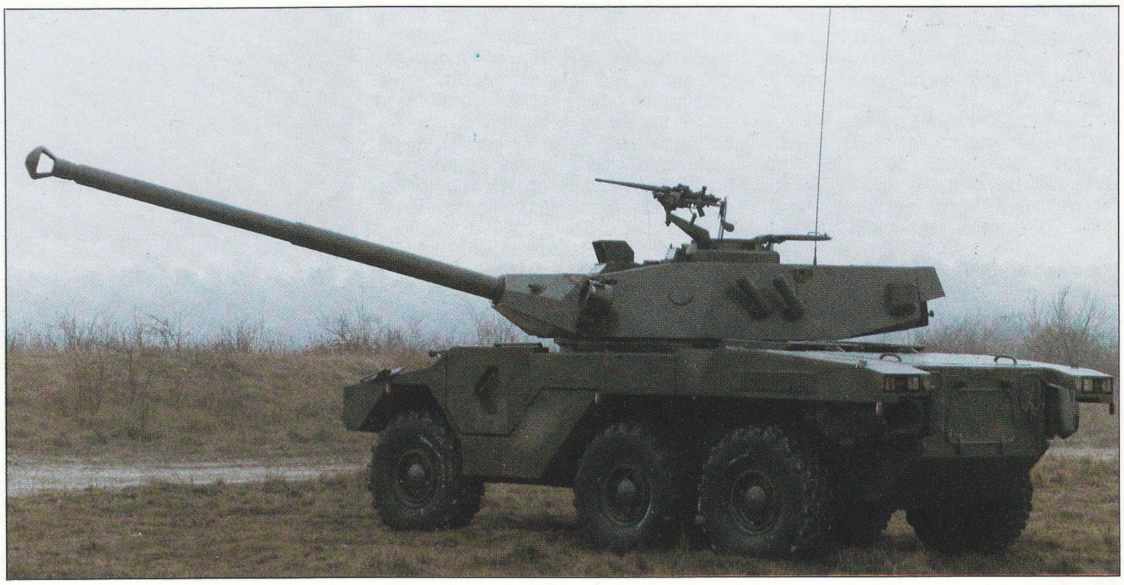
**Powerplant:** one Peugeot XD 3T 4-cylinder turbocharged diesel developing 105 hp (78 kW)

**Dimensions:** length 3.82 m (12 ft 6.4 in); width 2.02 m (6 ft 7.5 in); height without weapons 1.70 m (5 ft 6.9 in)

**Performance:** maximum road speed 100 km/h (62 mph); range 1000 km (621 miles); fording amphibious; gradient 50 per cent; side slope 30 per cent

FRANCE

# Panhard Sagaie 2 armoured car



*Panhard's private venture range of 6×6 armoured cars has attracted a number of export orders as well as interest from the French army. The ERC 90 has seen action in Chad's interminable civil war, and now equips part of the French rapid deployment force.*

In 1977 Panhard unveiled its private-venture range of 6×6 armoured vehicles, which included a family of armoured cars and a complete family of armoured personnel carriers all using identical automotive components with obvious training, logistical and cost advantages to the user.

The armoured car family was commonly known as the Engin de Reconnaissance Cannon (ERC) and included the ERC 90 F4 Sagaie 1, ERC 90 F1 Lynx, ERC 60/20 Serval, ERC 20 Kriss, and ERC 60/12 Mangouste. These were originally developed specifically for the export market, but the Sagaie 1 was subsequently adopted by the French army.

The Sagaie 1 is fitted with a two-man GIAT turret armed with a 90-mm (3.54-in) gun firing a range of ammunition including APFSDS (Armour-Piercing Fin-Stabilized Discarding-Sabot).

In 1985 Panhard announced that it had developed the Sagaie 2 armoured car and that one overseas country had already placed an order for the vehicle. The Sagaie 2 has a slightly longer and wider hull, and instead of the 90-mm GIAT TS-90 turret it is fitted with the SMM TTB-1900 turret, which has the same gun as the TS-90 turret. The SAMM turret has much improved armour protection, however, and is available with a wide range of turret controls, fire-control systems and optical devices. Two types of ammunition stowage are available, one having 35 rounds of 90 mm ammunition of which 13 are ready for immediate use, and the other 32 rounds of which 10 are for ready use.

The original Panhard Sagaie 1 was powered by a single Peugeot V-6 petrol engine developing 155 hp (116 kW), but the Sagaie 2 is powered by two Peugeot XD 3T 4-cylinder turbocharged diesels which develop a total of 196 hp (146 kW); these engines are also used in the Panhard VBL 4×4 light armoured vehicle. As an alternative the Sagaie 2 can be powered by two V-6 petrol engines developing a total of 290 hp (216 kW) which gives an exceptionally high power-to-weight ratio.

The Sagaie 1 and 2 have full 6×6 drive with powered steering on the front road wheels only. An unusual feature is that when travelling on roads the centre wheels can be raised clear of the ground, so reducing resistance and saving wear on the tyres. The wheels are normally lowered for cross-country use.

As with most armoured vehicles today a wide range of optional equipment can be installed, including a NBC system, a heater or air conditioning system, night vision equipment for the commander, gunner and driver, and a land navigation system.

### Specification

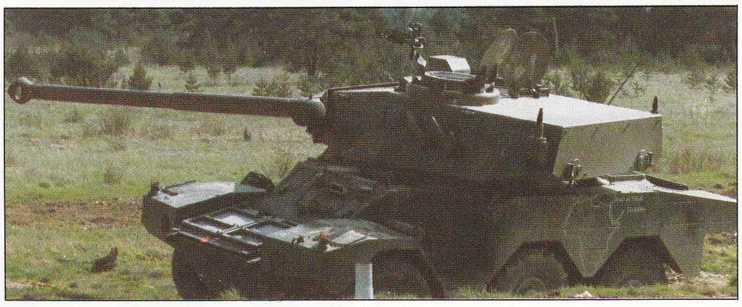
**Crew:** 3

**Weights:** loaded 10000 kg (22,046 lb)

**Powerplant:** two Peugeot XD 3T 4-cylinder diesels developing a total of 196 hp (146 kW), or two Peugeot 6-cylinder petrol engines developing a total of 290 hp (216 kW)

**Dimensions:** length, gun forward 7.97 m (26 ft 1.8 in) and hull 5.57 m (19 ft 3.3 in); width 2.70 m (8 ft 10.3 in); height 2.30 m (7 ft 6.6 in)

**Performance:** maximum road speed 100 km/h (62 mph); maximum road range 600 km (373 km); fording 1.2 m (3 ft 11 in); vertical obstacle 0.8 m (2 ft 7.5 in); trench 0.8 m (2 ft 7.5 in); gradient 50 per cent; side slope 30 per cent



*The Sagaie 2 was unveiled in 1985 and has been ordered by an as yet undisclosed country. It has a new turret and better armour protection, and is offered with a wide range of fire control systems and optical devices.*

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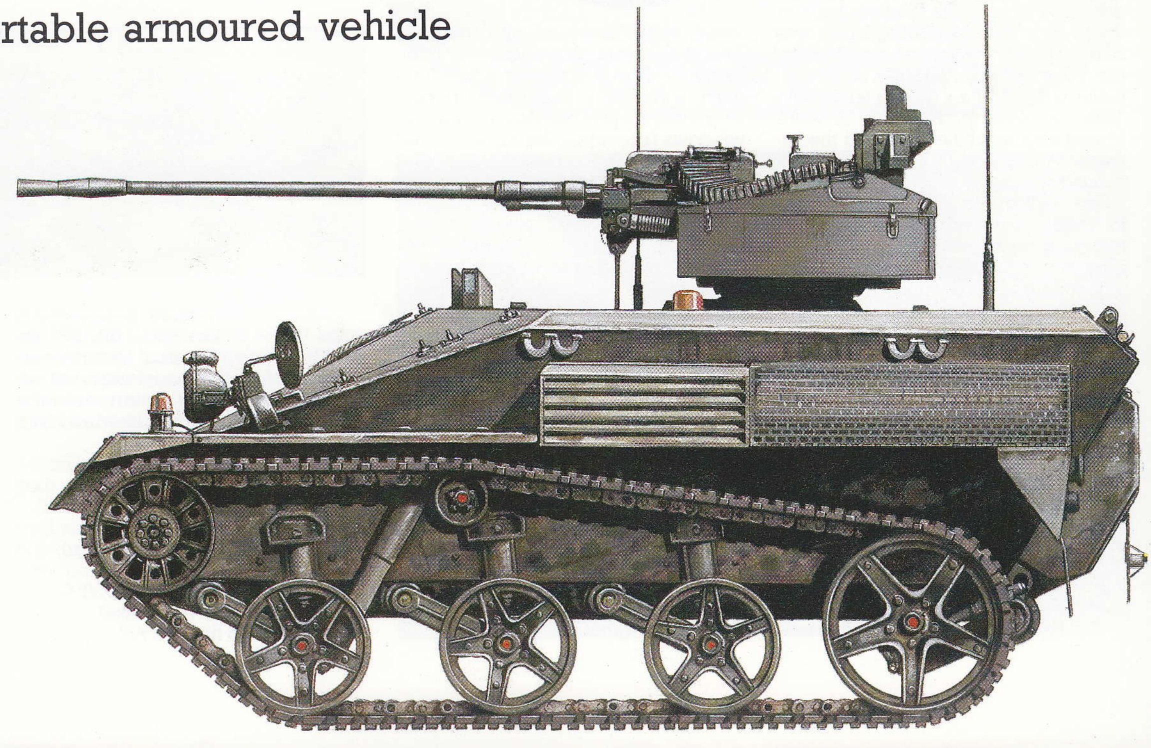
WEST GERMANY

# Wiesel air-portable armoured vehicle

Today the West German army has one three-brigade airborne division, and this uses the Faun Kraka 4×2 light cross-country vehicle for a wide range of roles including the carriage of TOW and Milan anti-tank guided weapons.

Many years ago the West German army issued a requirement for a new light armoured tracked vehicle for use by the airborne brigades, and Porsche was subsequently awarded a development contract. After prototypes had been built and tested, the whole project was shelved as the West German ministry of defence found that it could not fund all of its projects.

More recently this **Wiesel** has been tested by the US Army, while in 1984



*The Wiesel will provide West German paratroops with the sort of mobile fire support the ASU light tanks provide for the Soviet airborne forces. Two models are planned: one with a 20-mm canon, seen here, and another mounting TOW anti-tank guided missiles.*

the West German army announced that it was to fund final development of the Wiesel air-portable armoured vehicle and to purchase 312 production variants with first deliveries due in 1989.

Two basic models of the Wiesel are to be produced, one armed with a Hughes TOW anti-tank guided missile and the other with a 20-mm cannon.

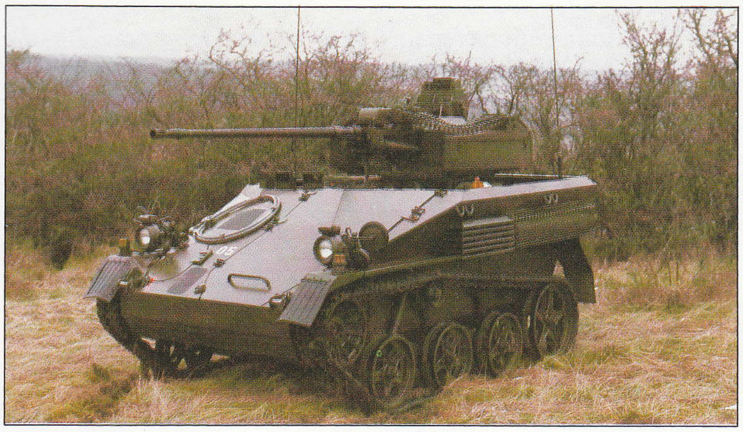
The first of these has a three-man crew and is armed with a Hughes TOW anti-tank guided missile launcher on an elevating pedestal which can be traversed 45° to each side of the centreline, and elevated and depressed 10°. Seven TOW missiles are carried, of which two are for ready use. In action, as soon as it has launched two missiles, the vehicle changes its firing position (to avoid being detected by the enemy) and loads another pair of TOWs.

The second model is armed with a Rheinmetall 20-mm dual-feed cannon in a turret which can be traversed 110° left and right while the cannon has an elevation of +45° and a depression of −10°. Some 400 rounds of 20-mm ammunition are carried, of which 160 rounds are for ready use and the remainder in reserve. This version has a two-man crew.

The hull of the Wiesel is of all-welded steel armour construction providing protection from small arms fire and shell splinters. The engine is at the front left and coupled to a fully-automatic transmission. The driver is seated at the front on the right, so leaving the complete rear of the vehicle clear for a weapons station.

As the Wiesel has been designed for air transport it is very compact and difficult to detect on the battlefield. A Sikorsky CH-53 helicopter, as used by West Germany, can carry two Wiesel vehicles, while a Lockheed C-130 Hercules transport aircraft can carry three internally and the Transall C.160 four.

The manufacturer has suggested that the Wiesel could be adopted for a wide range of other missions, all using the same basic chassis or a slightly longer chassis with an additional road wheel on each side. These variants include an anti-tank model with a turret for HOT missiles in the ready-to-launch position, an anti-aircraft model with Stinger surface-to-air missiles, a recovery vehicle, an ambulance, a reconnaissance vehicle, a command and control vehicle, a battlefield surveillance model and an armoured personnel carrier, to name but a few.



*Two Wiesels can be carried by a Sikorsky CH-53 helicopter and four by a Transall C-160 transport aircraft. The vehicle may be used for a variety of other roles including mobile SAM system, APC and command vehicle.*

### Specification

**Wiesel** (with TOW launcher)
**Crew:** 3
**Weights:** empty 2030 kg (4,475 lb); loaded 2750 kg (6,063 lb)
**Powerplant:** one 5-cylinder turbocharged diesel developing 86 hp (64 kW)
**Dimensions:** length 3.265 m (10 ft 8.5 in); width 1.82 m (5 ft 11.7 in); height 1.875 m (6 ft 1.8 in)
**Performance:** maximum road speed 80 km/h (50 mph); range 200 km (124 miles); vertical obstacle 0.4 m (1 ft 4 in); trench 1.2 m (3 ft 11 in); gradient 60 per cent; side slope 30 per cent

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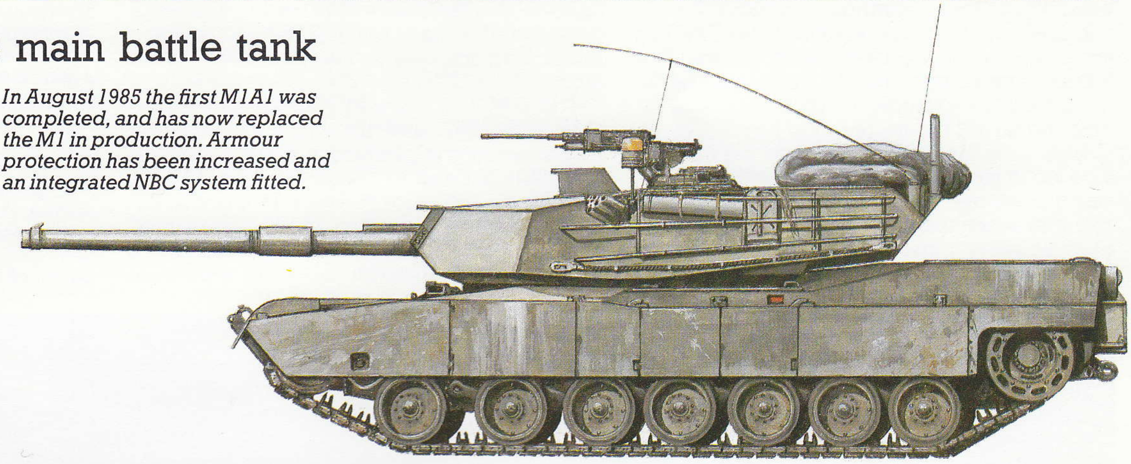
USA

## M1A1 Abrams main battle tank



*In August 1985 the first M1A1 was completed, and has now replaced the M1 in production. Armour protection has been increased and an integrated NBC system fitted.*

The first M1 Abrams MBT came off the production line at the Lima Army Tank Plant in February 1980, the initial vehicles from the Detroit Arsenal Tank Plant following two years later. The basic M1 is armed with a standard 105-mm (4.13-in) M68 rifled tank gun of the type also installed in the M48A5 and M60/M60A1/M60A3 MBTs. The M68 is essentially the British L7 gun, developed in the 1950s, but fitted with an US breech mechanism.

Some years ago the USA decided to adopt the West German Rheinmetall 120-mm (4.72-in) smoothbore gun already selected for the Leopard 2 MBT for an improved version of the M1, which was given the development designation **M1E1**. After the usual trials and modifications, this vehicle was accepted for service as the **M1A1 Abrams**, the first two production vehicles being completed August 1985. Other armament is a 12.7-mm (0.5-in) commander's machine-gun and a 7.62-mm (0.3-in) loader's machine-gun.

The 120-mm Rheinmetall gun is built under licence in the USA under the designation M256, with Honeywell responsible for the complete range of ammunition together with its combustible cartridge case. In addition to the making of the West German APFSDS-T (Armour-Piercing Fin-Stabilized Discarding-Sabot – Tracer) and HEAT-MP-T (High Explosive Anti-Tank – Multi-Purpose – Tracer), Honeywell has also developed new types with much improved armour-penetration characteristics.

In addition to the 120-mm gun, the M1A1 has a number of other improvements including increased armour protection and an integrated NBC system which not only provides the four-man crew with conditioned air for breathing but also supplied cooling or heating as long as the crew are wearing their protective suits and masks.

At one time both the Detroit Arsenal Tank Plant and the Lima Army Tank Plant were producing both the M1 and M1A1, but from early 1986 only the M1A1 was in production. At present there are no plans for the 105-mm armed M1 to be upgunned with the 120-mm gun.

As the M1/M1A1 will remain in service until the 21st century many other improvements are already under development, including a new and safer laser rangefinder, an improved commander's weapon station with panoramic sight, and a rapid refulling capability.

The M1 Abrams has already been evaluated by Saudi Arabia and Switzerland, but so far no export orders have been placed.

At present there are no variants of the M1/M1A, although under development by BMY is the **Heavy Assault Bridge** which uses a M1 chassis. It is probable that an armoured recovery vehicle will be developed on the M1 chassis as the current M88A1 is not powerful enough to handle the M1A1.

Undergoing trials is the **Tank Test Bed** which is a M1 chassis with an externally-mounted 120-mm gun, the three-man crew being safely seated within the hull.

*The production M1A1s carry the same Rheinmetall 120-mm smooth-bore gun as the Leopard 2; it has a combustible case and fires APFSDS ammunition. The M1A1 will be the MBT of the US Army until well into the 21st century.*

### Specification

**M1A1**
**Crew:** 4
**Weight:** loaded 57154 kg (126,000 lb)
**Powerplant:** one Avco Lycoming AGT-1500 gas turbine developing 1,500 hp (1118 kW)
**Dimensions:** length, gun forward 9.83 m (32 ft 3 in) and hull 7.925 m (26 ft 0 in); with 3.658 m (12 ft 0 in); height overall 2.896 m (9 ft 6 in)
**Performance:** maximum road speed 67 km/h (41.6 mph); range, road 465 km (288 miles); fording 1.219 m (4 ft 0 in); vertical obstacle 1.066 m (3 ft 6 in); trench 2.743 m (9 ft 0 in); gradient 60 per cent; side slope 30 per cent

# The Future of the Tank

*The latest generation of main battle tanks is more powerful than ever before, protected by new types of armour and yet, fitted with a new generation of powerplant, more agile than their predecessors. Increasing use of computerization and automated equipment enables them to remain the most important weapon on the battlefield despite the vast range of anti-tank weapons now available.*

With one or two exceptions, the basic design of the tank has remained virtually unchanged since the 1920s: the driver at front, the turret in centre, and the engine and transmission at rear.

Since World War II there have been many prototypes of new concepts in tank design, but until fairly recently the only one to enter production was the Swedish Bofors S-tank. This has a three-man crew and is armed with a 105-mm (4.13-in) gun fed by an automatic loader holding a mixture of 50 rounds of ammunition. This makes possible a rate of fire of 15 rounds per minute until the ammunition supply has been exhausted. The empty cartridge cases are ejected out of a trap door in the rear of the hull.

In the S-tank, the gun is aimed by the driver traversing tank on its tracks to lay onto the target in azimuth, and raising and lowering the hydropneumatic suspension to lay in elevation. Although the S-tank has been evaluated by a number of other countries, including the UK and USA, the only customer was the Swedish army, which has just over 300 in service. The S-tank does, however, suffer from a number of limitations: for example, it has to stop and lay onto the target before opening fire.

Most light tanks and armoured cars in service today have a two-man turret with the commander on one side and the gunner on the other, in action the commander acting as loader as well as commanding the vehicle and looking after the communications equipment.

Shortly after the end of World War II France introduced the AMX-13 light tank, which had an unusual oscillating turret armed with a 75-mm (2.95-in) gun fed by two revolver type magazines each holding six rounds. Once a round had been fired the empty cartridge case was ejected out of a door in the bustle rear and another round was loaded automatically. This enabled 12 rounds to be fired very quickly, but the crew then had to dismount and reload the two magazines via hatches in the roof. The US Army also experimented with oscillating turrets on heavier tanks, but none of these entered production.

## Three-man crew

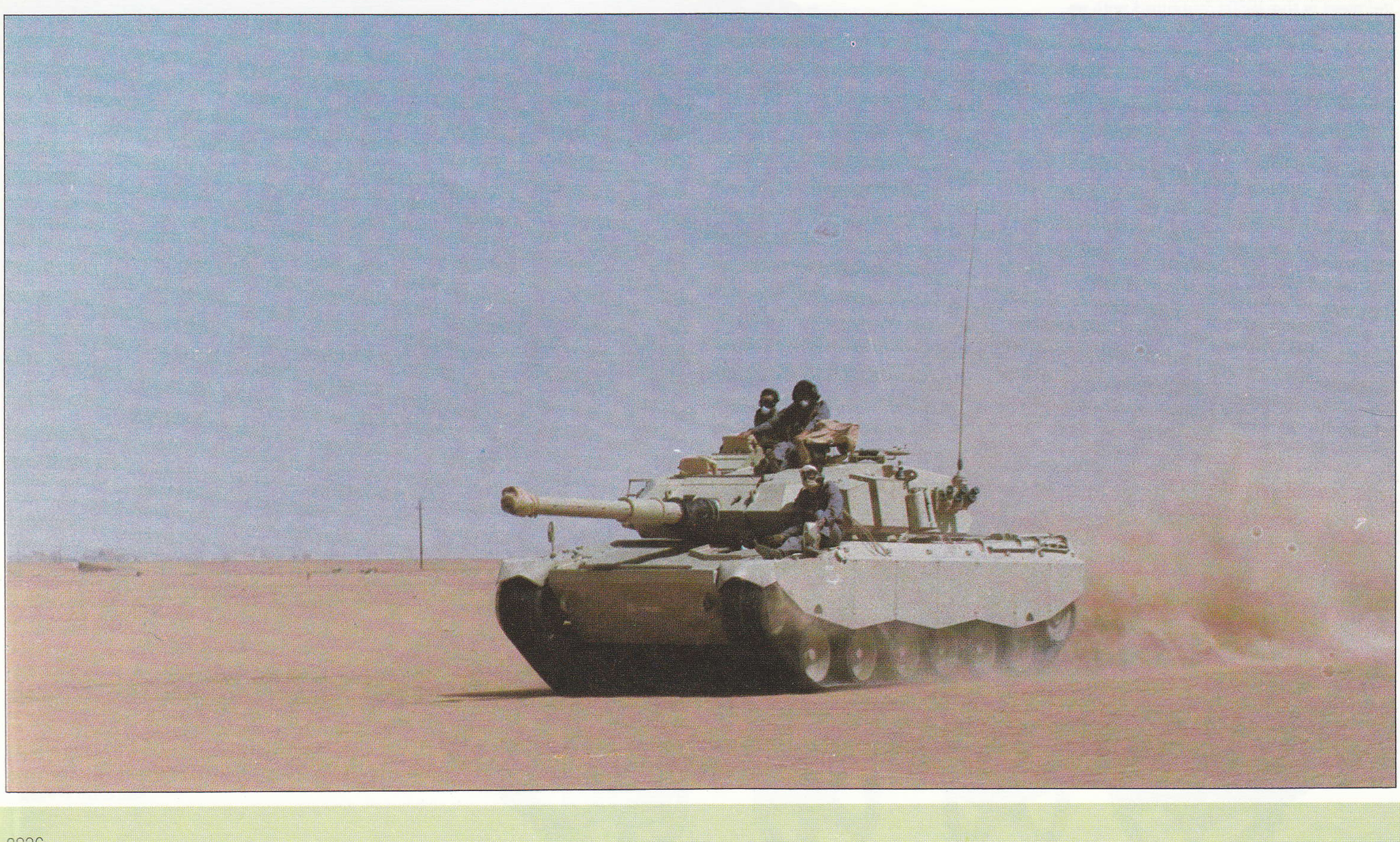
The first country to field a turreted MBT with a three-man crew was the USSR with its T-64, which entered production in 1967. The T-64 continued in production until 1981 but was not exported outside of the Warsaw Pact and is believed to have had many shortcomings, especially with its automatic loader. This is reported often to have put one of the turret crew rather than ammunition into the breech of the gun!

The T-72 was followed in production by the T-72 during 1971 and this, with some improvements, remains in production today, not only in the USSR but also in Czechoslovakia, Poland, Yugoslavia and more recently India.

At present all Western MBTs have a four-man crew, but the new French MBT will have a three-man crew thanks to the use of an automa-

*The Israelis are the most successful practitioners of armoured warfare since World War II, and it is significant that their only indigenous tank design is a ponderous, heavily-protected vehicle, the Merkava.*

*A Brazilian Osorio puts on a turn of speed during testing. The sheer complexity of the new generation of MBTs has dramatically escalated their cost and created a market for a less capable but much more affordable type of tank.*



tic loader. The installation of an automatic loader offers a number of advantages apart from reducing the crew, including a high rate of fire especially when moving across country.

There are three key areas of tank technology (armour, mobility and firepower) and there have been significant improvement in each of these areas in recent years.

For many years all tanks had steel armour which was well sloped on the front for increased protection. Developments in anti-tank ammunition, especially the High Explosive Anti-tank (HEAT) warheads fitted to anti-tank guided weapons (such as the 'Sagger', Milan and HOT) and Armour-Piercing Fin-Stabilized Discarding-Sabot (APFSDS) ammunition then reached the point at which such rounds could penetrate the frontal armour of the heaviest tanks in service.

The introduction of the British Chobham armour, still one of the closest guarded military secrets, has meant that MBTs such as the M1 Abrams and Challenger are virtually invulnerable to penetration over their frontal arc.

Chobham armour cannot at present be fitted to existing tanks and has to be designed into the vehicle. But several years ago Israel announced that it had developed reactive armour which could be fitted to any existing tank and provide protection against HEAT attack. This reactive armour is called Blazer and consists of small panels of explosive that are bolted onto the tank, for example over the frontal arc. When one of the Blazer panels is hit it explodes outwards, so dissipating the main force of the incoming HEAT warhead.

There are other ways of making the tank more survivable on the battlefield as well as improving armour protection. This includes the installation of grenade-launchers to the front of the turret which can fire smoke grenades to confuse the enemy or lay a smoke screen to allow the tank to move back behind cover. More recently decoy grenades have been developed which can also be fired from these launchers to decoy enemy anti-tank guided weapons.

## Diesel fuel smoke screen

For many years Soviet armoured vehicles have been able to inject diesel fuel into their exhaust systems to lay a smokescreen, and a number of Western countries (including the USA) are installing similar systems in their armoured vehicles (for example the US M60 series MBT and the Bradley IFV).

Careful stowage of fuel and ammunition can also increase the survivability of a tank. In the US M1/M1A1 Abrams, for example, some of the ready-use ammunition is stowed in the turret bustle and separated from the crew by sliding doors. If one of these rounds explodes, the main force of the explosion is vented upwards to the roof provided that the doors are shut. In the roof are blowout panels which give way under the force of the explosion.

For many years most tanks and armoured fighting vehicles have been fitted with fire-detection and fire-suppression systems in the engine compartment. If the engine catches fire an alarm sounds and the fire is automatically extinguished. This provision has now been extended to the crew compartment, and the system will detect (for example) a HEAT charge as soon as it penetrates the armour of the tank and then extinguish the fire in milliseconds.

In the future tanks will have other aids to increase their survivability on the battlefield, such as sensors to detect incoming missiles and activate countermeasures. Already available are devices that will tell a tank crew that it is being ranged by enemy lasers.

The firepower of the tank comprises not only the gun and its ammunition but also its fire-control system. For many years all tanks had rifled tank guns, but many of the more recent tanks (for example the Leopard 2, M1A1 Abrams, AMX-40, T-62, T-64 and T-72) have a smoothbore gun. There is a fierce debate as to which is the better type, and there are good arguments for both.

Until the 1960s the main tank-killing rounds carried by tanks were Armour-Piercing Discarding-Sabot (APDS), High Explosive Anti-Tank and High Explosive Squash-Head (HESH). New types of advanced armour have very much reduced the effectiveness of these rounds, especially HEAT and HESH. Most tanks now fire Armour-Piercing Fin-Stabilized Discarding-Sabot (APFSDS) rounds which have a penetrator of very strong, heavy metal such as depleted uranium, and thus greatly increased armour-penetrating characteristics.

Tank gunnery has made dramatic advances over the last few years, with the laser rangefinder replacing optical rangefinders and the ranging machine-gun. Most modern tanks are now fitted not only with a computerized fire-control system but also with a stabilization system that allows the tank to aim and fire the gun accurately at moving targets while it also is moving. Commanders and gunners can even have stabilized sights incorporating a laser rangefinder. In the future fire-control systems will be able automatically to detect enemy vehicles and to align the gun with the target, leaving the gunner merely to open fire.

The main armament of tanks will remain the gun, but there are already a number of new weapons on the horizon which could supplement or replace the current types, these including liquid-propellant guns, electromagnetic guns and offensive lasers.

## Turret-mounted guns

With the exception of the S-tank, all current tanks have turret-mounted guns. For some time there have been a number of trials vehicles fitted with an external gun fed by an automatic loader, their crews being seated safely in the low hull. The installation of an external gun with

*Typical of the latest generation of MBTs, the AMX-40 has been designed for the export market, while the French army continues to use the outdated AMX-30. Protected by laminate armour conferring good protection against HEAT warheads, it carries an 120-mm smooth-bore gun.*

*The Vickers Mk 7 has successfully completed testing in Egypt. It is fully air conditioned and NBC protected; standard equipment also includes an automatic fire detection and suppression system. Its thermal sight has an alarm to alert the crew to enemy presence.*

*The tank destroyer concept has recently been resurrected as various companies have designed light tanks for the US light divisions. The FMC CCV-L weighs under 20 tonnes but carries the same 105-mm gun as the M60 series MBTs (fitted with a low recoil system).*

automatic loader and recent advances in electronics would perhaps enable tanks with just two men to be fielded. When used in a defensive role, a tank with an external gun would be very difficult to detect, let alone hit.

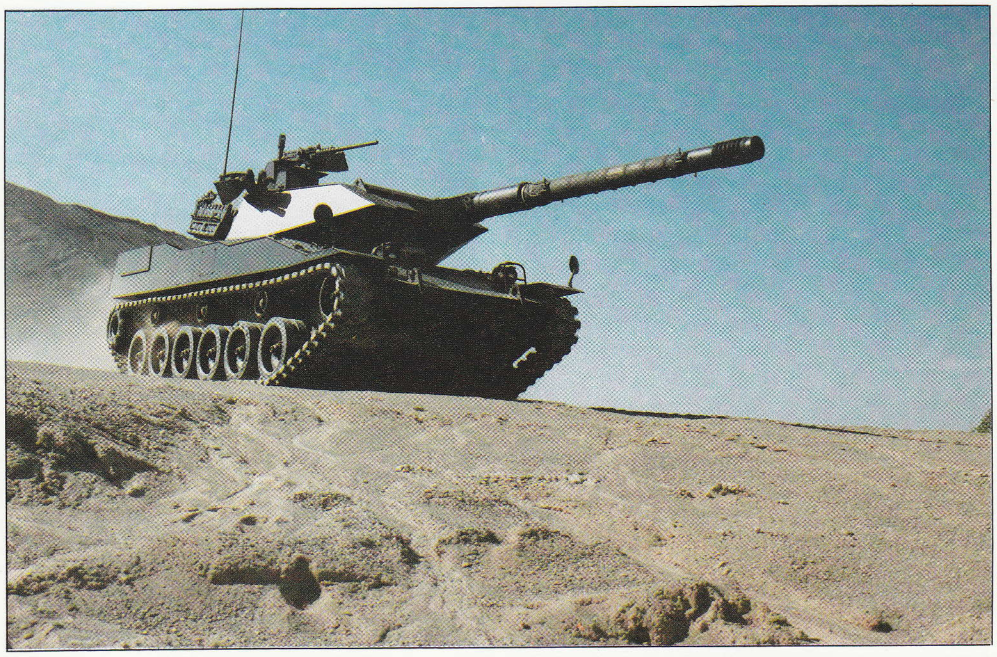
Once tanks could fight only in daylight, but the introduction of infra-red night-vision equipment, even with its disadvantages, allows the tank to move and fight at night. Infra-red equipment is now giving way to image intensification and thermal imagers which are even more effective, the latter allowing a tank gunner to see through trees and smoke.

## Heavy models

Many of today's tanks are heavier than their predecessors: for example, the Leopard 2 weighs 55 tonnes compared with 40 tonnes of the original Leopard 1. Much of this weight increase is additional armour, but at the same time much more powerful engines have been installed. Thus the Leopard 2 is not only faster than the older Leopard 1 but also has a much better power-to-weight ratio and is faster across country. New advances in suspension design, such as the hydro-pneumatic system installed on the Challenger, permit tanks to move faster across country and also provide a better ride for the crew and a more stable gun platform.

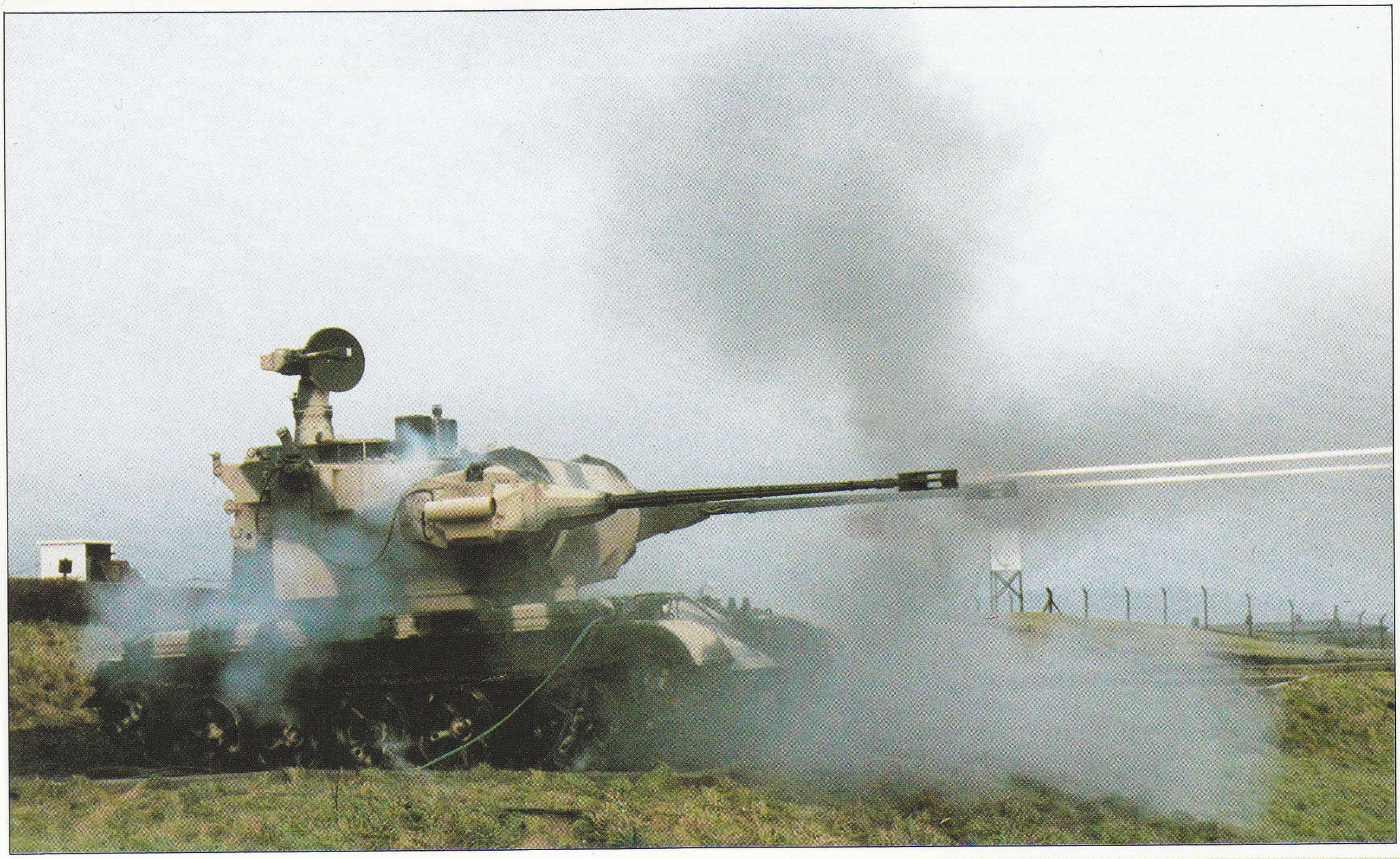
For many years tanks were powered by petrol engines, but these had very short operating ranges and there was always the constant danger of fire, so most tanks today have the more fuel-efficient diesel engine and thus greater operating ranges. There are exceptions, however: the S-tank has a diesel engine and a gas turbine (the latter being engaged when the tank is moving across country) whilst the US M1/M1A1 has a gas turbine. The latter is much smaller than a diesel engine but uses more fuel.

Tank design is at the crossroads and future tanks may well be quite different to the ones we know today. There are still a few people who firmly believe that the tank is dead and that it cannot survive on the battlefield of the future. But there is at present no substitute for the tank, and it will remain the key to success in the land battle well into the next century.



*Stingray is a 20-tonne light tank which uses the suspension of the M109 SP gun and carries the British 105-mm gun. The tank is only really protected from small-arms fire, although reactive armour could be fitted to keep out HEAT projectiles.*

*Marksman uses the same twin 35-mm cannon system as used on the West German Gepard. It carries 230 rounds of ready-use ammunition plus 20 APDS-T (Armour-Piercing Discarding-Sabot – Tracer) to deal with ground targets.*



USA

## Close Combat Vehicle – Light

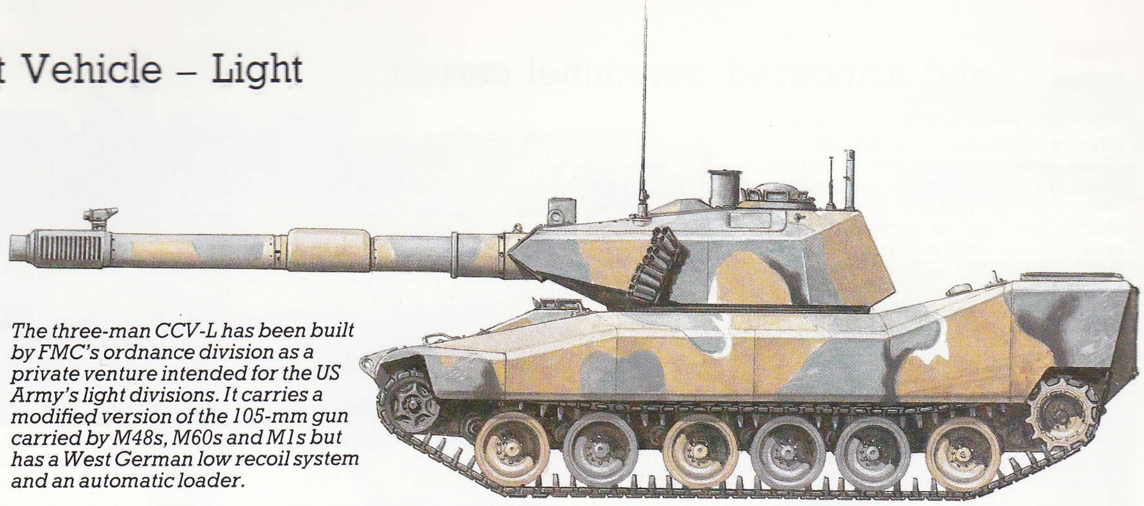
The Ordnance Division of the FMC Corporation of San Jose, California, is the largest manufacturer of tracked vehicles in the West, having produced over 70,000 units in the M113 series of armoured personnel carriers and over 2,000 Bradley Infantry Fighting Vehicles, plus large numbers of armoured amphibious tracked vehicles, reconnaissance vehicles, M59s and Armoured Infantry Fighting vehicles.

Several years ago the company realized that the US Army would require a highly mobile armoured vehicle armed with a 105-mm (4.13-in) standard tank gun for use with its light divisions. A decision was then taken to design and build a prototype of the **Close Combat Vehicle – Light (CCV – L)** with company money.

The first prototype of the CCV – L was unveiled late in 1985 and attracted a great deal of interest as its crew had been reduced to just three men (commander, gunner and driver) by the installation of an automatic loader for the main armament.

The prototype cost $26 million to build, of which around $14 million came from FMC and the remainder from the many subcontractors involved in the project.

To reduce development time and cost, proven automotive components have been used in the design of the CCV – L: for example, the engine uses many parts of the 8V-92TA engine installed in the Heavy Expanded Mobility Tactical Truck which has been in service with the US Army for some years, the transmission is from the FMC-built Bradley IFV, and parts of the suspension are from the M113A2.



*The three-man CCV-L has been built by FMC's ordnance division as a private venture intended for the US Army's light divisions. It carries a modified version of the 105-mm gun carried by M48s, M60s and M1s but has a West German low recoil system and an automatic loader.*

The main armament comprises a 105-mm M68A1 gun of the type installed in the M48A5, M60/M60A1/M60A3 and M1 MBTs already in service with the US Army, but in this application fitted with a West German Rheinmetall low recoil system. The automatic loader for the main armament has been designed by FMC Northern Ordnance Division, which has some 40 years of experience in designing and building automatic loaders mainly for naval applications. The automatic loader makes possible a rate of fire of 12 rounds per minute. Nineteen rounds are carried in the automatic loader, with a further 24 rounds carried elsewhere in the hull.

The turret traverse and weapon elevation systems are based on those installed in the M1. The gunner has a stabilized day/night sight with laser rangefinder, while the commander has periscopes for all-round observation and an independent thermal viewer which can be traversed through 360° and has a day/night capability.

The US Army has a requirement for a vehicle it calls the Armoured Gun System (AGS) and hoped to get some funding for this in the FY87 budget, but this has been disapproved. So far three US companies have built vehicles which could meet the AGS requirement: these are the FMC Close Combat Vehicle – Light, the Cadillac Gage Stingray and the Teledyne Continental Motors General Products Division TCM-20.

### Specification

**CCV – L**

**Crew:** 3

**Weights:** empty 17509 kg (38,600 lb); loaded 19414 kg (42,800 lb)

**Powerplant:** one Detroit Diesel Model 6V-92 TA 6-cylinder diesel developing 552 hp (412 kW)

**Dimensions:** length, gun forward 9.37 m (30 ft 9 in) and hull 6.20 m (20 ft 4 in); width 2.69 m (8 ft 10 in); height 2.36 m (7 ft 9 in)

**Performance:** maximum road speed 70 km/h (43.5 mph); range 483 km (300 miles); fording 1.32 m (4 ft 4 in); vertical obstacle 0.76 m (2 ft 6 in); trench 2.13 m (7 ft 0 in); gradient 60 per cent; side slope 40 per cent

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USA

## Stingray light tank

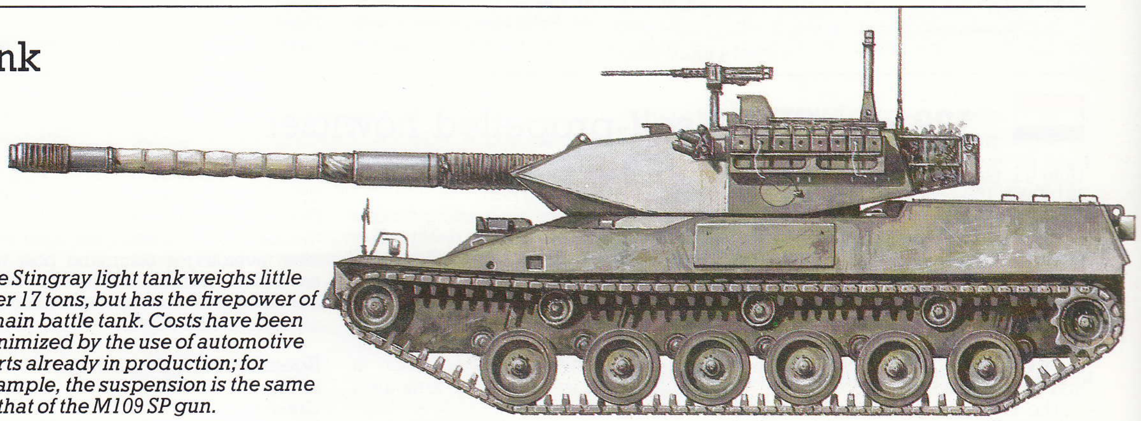
Since the early 1960s the Cadillac Gage Company has built over 3,500 of its Commando range of 4×4 multi-mission vehicles, most of which have been exported. More recently the company has developed and placed in production the V-300 6×6 and Commando Scout 4×4 vehicles, while the Commando Ranger 4×4 light armoured personnel carrier has been built in large numbers for the the US Air Force base-production role.

Some years ago Cadillac Gage realized that there was a need for a light tank with good cross-country mobility, the combat-proved 105-mm (4.13-in) tank gun, and simplicity of operation and maintenance. With this requirement in mind the company designed and built the **Stingray** light tank, whose prototype was unveiled for the first time late in 1984.

To reduce development and procurement costs, proved and in-production automotive components have been used wherever possible: for example, the suspension is the same as that on the M109 self-propelled howitzer used by more than 20 countries.

The turret and hull are of all-welded steel armour construction providing complete protection from small arms fire and shell splinters. If required, additional armour can be added, for example of the reactive type which provides protection against HEAT projectiles.

Main armament comprises a British Royal Ordnance Nottingham 105-mm rifled tank gun which fires an identical range of ammunition to that of the L7/M68 gun used in many MBTs (including the Leopard 1, M48A5, M60, M1, Merkava and some models of the Centurion) and including the recent APFSDS-T (Armour-Piercing Fin-Stabilized Discarding-Sabot – Tracer).



*The Stingray light tank weighs little over 17 tons, but has the firepower of a main battle tank. Costs have been minimized by the use of automotive parts already in production; for example, the suspension is the same as that of the M109 SP gun.*

Mounted co-axial with the main armament is a 7.62-mm (0.3-in) machine-gun for the engagement of soft targets such as trucks or infantry, while a 7.62-mm or 12.7-mm (0.5-in) machine-gun is mounted on the roof for anti-aircraft defence. Mounted on each side of the turret is a bank of electrically-operated smoke-dischargers.

The turret has power controls, and the prototype Stingray has a Marconi Command and Control System computerized digital Fire-Control System, which gives a high first-round hit probability. As an option a stabilization system can be installed, allowing the main armament to be laid and fired while the Stingray is moving across country.

As with most armoured vehicles today, a wide range of optional equipment is available to suit different user's requirements: for example, a land navigation system, a laser rangefinder, an NBC system, and a fire detection and suppression system.

So far the Stingray is still at the prototype stage, but a number of countries are showing more than a passing interest in this vehicle, which has the mobility and firepower of a MBT but is much cheaper.

*Right: Given the vulnerability of many MBTs to HEAT warheads, the light armour of Stingray is not necessarily a great disadvantage. A stabilization system can be fitted, enabling the main armament to be aimed and fired while the vehicle is moving.*

### Specification

**Stingray**

**Crew:** 4

**Weights:** empty 17237 kg (38,000 lb); loaded 19051 kg (42,000 lb)

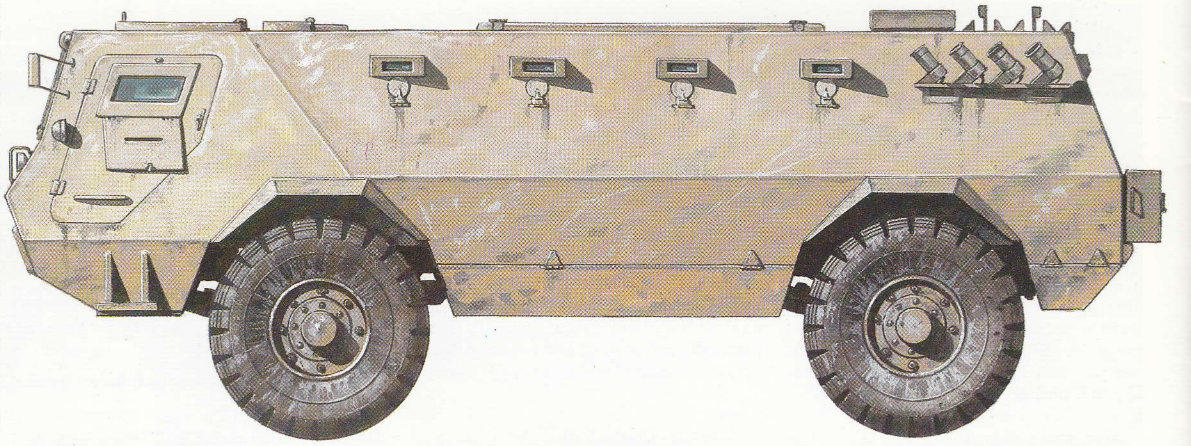
**Powerplant:** one Detroit Diesel Model 8V-92 TA diesel developing 535 hp (399 kW)

**Dimensions:** length, gun forward 9.35 m (30 ft 8 in) and hull 6.30 m (20 ft 8 in); width 2.71 m (8 ft 11 in); height overall 2.54 (8 ft 4 in)

**Performance:** maximum road speed 69 km/h (43 mph); range 483 km (300 miles); fording 1.22 m (4 ft 0 in); vertical obstacle 0.76 m (2 ft 6 in); trench 1.69 m (5 ft 7 in); gradient 60 per cent; side slope 30 per cent

EGYPT

# Fahd armoured personnel carrier



*Soon to enter producton, the Fahd APC is based on a Daimler-Benz truck chassis and can carry 10 fully-equipped troops. Firing ports in the side and rear allow them to fire their weapons from the vehicle.*

For many years one of the standard wheeled armoured personnel carriers of the Egyptian army has been the Walid. This 4×4 vehicle is essentially a West German Magirus Deutz truck chassis fitted with an armoured body designed and built in Egypt. In many respects the Fahd fulfils a similar role to that of the Soviet BTR-40 vehicle which has also been used by the Egyptian army. The BTR-40 does, however, suffer the major disadvantge in having an open-topped troop compartment, so making the troops vulnerable to shell splinters.

The **Fahd** 4×4 armoured personnel carrier has been designed and built by the Kadar Factory for Developed Industries in Heliopolis not only to meet the demanding requirements of the Egyptian army but also for the export market. The vehicle was first shown in public late in 1984 and is expected to enter production in the very near future.

The vehicle consists basically of the proven Daimler-Benz LAP 1117/32 4×4 truck chassis fitted with a fully armoured body that provides complete protection against penetration from 7.62-mm×54 armour-piercing projectiles and shell splinters.

The commander and driver are seated at the very front of the vehicle, with the troop compartment at the rear. The 10 fully equipped infantrymen are seated down the centre of the vehicle, and enter and leave via a rear hatch, of which the upper part opens upwards and the lower part folds down to provide a step.

In the sides and rear of the troop compartment are firing ports, each with a bulletproof vision block above it, allowing the infantrymen to fire their weapons from within the vehicle.

The standard commercial Mercedes-Benz six-cylinder diesel engine is coupled to a fully automatic gearbox and a two-speed transfer case. Steering is power-assisted to reduce driver fatigue, and standard equipment includes a tyre pressure-regulation system that allows the driver to adjust the pressure to suit the type of ground being crossed, this being of great use when the Fahd is crossing desert terrain. The wide low-pressure tyres are of the run-flat type, and allow the vehicle to travel for a distance of 50 km (31 miles) at a speed of 30 km/h (18.6 mph) if they are punctured by small arms fire or shell fragments.

As usual, the Fahd can be fitted with a wide range of optional equipment including a front-mounted winch (used to recover other vehicles or itself), night-vision equipment and an NBC pack.

The basic vehicle is at present unarmed, although a wide range of armament systems can be fitted including a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun, or a 20-mm cannon. The type can also operate in the anti-tank role with wire-guided anti-tank systems such as the Euromissile Milan. More specialized variants include a command post with extensive communications equipment, a recovery vehicle, a reconnaissance vehicle, a multiple rocket – launcher, a forward ambulance and a supply carrier.

## Specification

**Fahd**

**Crew:** 2+10

**Weights:** empty 9100 kg (20,026 lb); loaded 10900 kg (24,030 lb)

**Powerplant:** one Mercedes-Benz OM-352 A 6-cylinder turbocharged diesel developing 168 hp (125 kW)

**Dimensions:** length 6.00 m (19 ft 8.2 in); width 2.45 m (8 ft 0.5 in); height 2.10 m (6 ft 10.7 in)

**Performance:** maximum road speed 90 km/h (56 mph); maximum range 800 km (497 miles); fording 0.7 m (2 ft 4 in); vertical obstacle 0.5 m (1 ft 4 in); trench 0.8 m (2 ft 8 in); gradient 70 per cent; side slope 30 per cent

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EGYPT

# 122-mm SP122 self-propelled howitzer

Until the recent introduction of the US M109A2 155-mm (6.1-in) self-propelled howitzer, virtually all Egyptian artillery was towed, most of this having been supplied by the USSR and including large numbers of excellent 122-mm (4.8-in) D-30s, whose ammunition Egypt has been making for some years. More recently Egypt has started to produce the D-30 for both the home and export markets.

The Egyptian army decided that it wanted a self-propelled version of the D-30 more advanced than the Syrian version, which was essentially an old T-34/85 tank with its turret replaced by a D-30 firing over the rear engine decking; no protection is provided for the gun crew from small arms fire and shell splinters.

In 1984 it was announced that BMY of the USA and Royal Ordnance of the UK had each been awarded contracts to design and build a self-propelled version of the D-30 which would eventually be made in Egypt. The prototypes made their first official appearance at a defence exhibition in Cairo late in 1984.

The BMY entry in this competition consists essentially of a M109 chassis with a new fixed superstructure at the rear: in the forward part of this is the D-30 howitzer, which has an elevation of +70° a depression of −5° and a traverse of 30° left and right. Some 85 rounds of 122-mm ammunition are carried, of which five are normally HEAT (High Explosive Anti-Tank). Mounted on the roof is a 12.7-mm (0.5-in) M2 HB machine-gun, for which 500 rounds of ammunition are carried.

Rather than use an existing chassis Royal Ordnance Leeds designed a new vehicle from scratch of all welded steel construction rather than aluminium as used in the BMY entry. The reason for this was that steel is easier to weld than aluminium, and Egypt already has extensive experience in using this material in other armoured vehicle programmes.

The layout of the Royal Ordnance D-30 self-propelled howitzer is similar to the BMY type, but is much more compact. The driver is at the front left with engine to his right and the gun compartment at rear. Weapon elevation, depression and traverse are identical to the BMY vehicle, and 80 projectiles and charges are carried. A 12.7-mm M2 HB machine-gun is carried on the roof for anti-aircraft defence.

The Perkins diesel engine is coupled to a fully automatic Self-Changing Gears six-speed transmission. Some parts of the suspension are also used in the Royal Ordnance Nottingham Combat Engineer Tractor already in service with the British and Indian armies.

Royal Ordnance Leeds expects that SP122 will be the first of a complete family of light tracked vehicles using the same basic chassis, the other vehicles including a command post with extensive communications equipment, a recovery vehicle, an ambulance and an ammunition carrier.

## Specification (provisional)

**SP122**

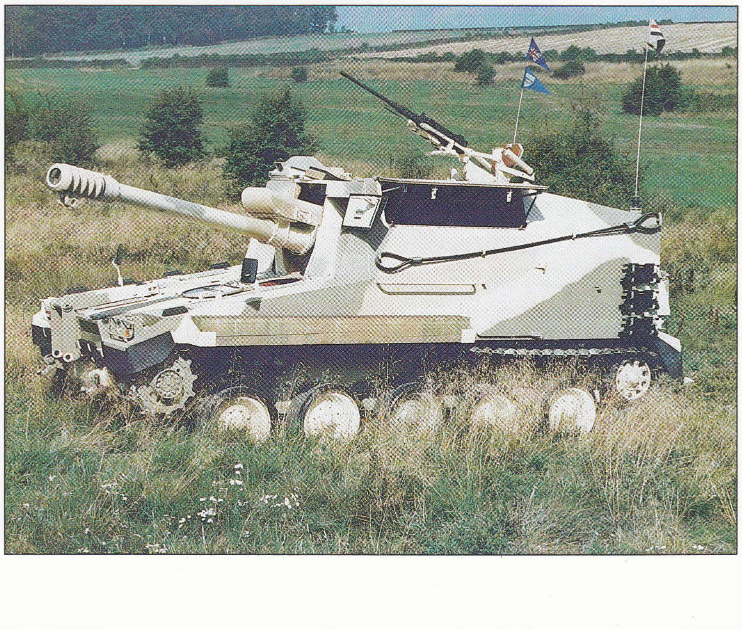
**Crew:** 5

**Weights:** empty 17500 kg (38,580 lb); loaded 20000 kg (44,092 lb)

**Powerplant:** one Perkins TV8.540 eight-cylinder diesel developing 300 hp (224 kW)

**Dimensions:** length 7.70 m (25 ft 3 in); width 2.82 m (9 ft 3 in); height 2.69 m (8 ft 10 in)

**Performance:** maximum road speed 55 km/h (34 mph); range 300 km (186 miles); fording 1.0 m (3 ft 3 in); vertical obstacle 0.75 m (2 ft 6 in); trench 2.2 m (7 ft 3 in); gradient 60 per cent; side slope 30 per cent



*Egypt has been manufacturing the Soviet D-30 122-mm gun for some years, and invited Royal Ordnance and BMY in the USA to produce a self-propelled version. Royal Ordnance have designed a completely new chassis, which may also be used for a whole family of AFVs.*

# Argentina

Despite losing the 1982 Falklands war in a fairly ignominious manner, the Argentine armed forces are now stronger than ever and, more importantly, have taken the lessons of poor leadership, lack of training and bad tactics to heart by correcting them in the most efficient manner available. The only problem in doing this has stemmed from Argentina's economic troubles, which have forced a curtailment of pace in some areas. In any future conflict with the UK, however, it is certain that the three services would make a markedly better showing than they managed in 1982.

## The Army

The 55,000-man army has been much reduced in size but reorganized along more sensible lines to cover the five military regions and garrison areas into which Argentina is divided. Despite the political settlement of the Beagle Channel dispute with Chile, large elements of the army are still located in the vicinity of the border. A total of four corps command the following units, many of which are at cadre strength and would only be brought up to full complement during wartime by mobilization of the reserves:

two armoured cavalry brigades (each with two armoured cavalry regiments, one tank regiment and one artillery battalion),
three mechanized infantry brigades (each with three mechanized infantry regiments, one armoured cavalry squadron, one engineer battalion and one artillery battalion),
two motorized infantry brigades (each with three motorized infantry regiments, one armoured cavalry squadron, one engineer battalion and one artillery battalion),
two jungle brigades (each with three jungle light infantry regiments, and one heavy mortar artillery battalion),
one airborne brigade (of three airborne regiments and one artillery battalion),
two mountain infantry brigades (each with three mountain infantry regiments, one reconnaissance company, one engineer battalion and one artillery battalion),
three independent horse cavalry regiments,
one presidential guard tank regiment,
one independent mechanized infantry regiment,
one independent airborne infantry regiment,
four independent field artillery battalions,
five air-defence artillery battalions,
one independent engineer regiment,
five engineer construction battalions,
five logistic support battalions, and
one amphibious engineer battalion.

*Above: Conscripts after their surrender to the British on the Falklands. Today's Argentine army is very different from the badly-led force entrusted with the islands' defence. Reorganized, and slimmed down, it is now even better equipped than before the war.*

Practically all the *matériel* and weapon losses suffered during the Falklands war have now been made good from the indigenous arms industry and foreign sources. Argentina is militarily the most self-sufficient of the Latin American states and is capable of producing fairly sophisticated weaponry such as tactical surface-to-surface missiles. Called the Condor, the first version is a single-stage solid-propellant weapon that can carry a 475-kg (1,047-lb) payload to a range of 75 km (46.6 miles) or a 350-kg (772-lb) payload to a range of 150 km (93.2 miles). A two-stage version with a range of 650 km (404 miles), which is sufficient to hit the Falklands from the mainland, is under development. Most heavy weapons such as MBTs, APCs and artillery are produced under licence from European manufacturers (notably in France, Italy and West Germany) although several locally produced and designed heavy artillery pieces are now in service. A full list of the equipment in service use is:

**Armour:** M4 Sherman Firefly and TAM MBTs; AMX-13FL-12 and M41 light tanks; AML-90 armoured cars; and AMX-VCI, BDX, M3 halftrack, M113A1, MOWAG Roland and VTCP APCs;
**Artillery:** (towed) 105-mm (4.13-in) pack howitzer, 105-mm M101 howitzer, 155-mm (6.1-in) M53 gun, 155-mm M114 howitzer, 155-mm CITEFA Model 77 howitzer and 155-mm CITEFA Model 81 howitzer;
(self-propelled) 105-mm M7 SP howitzer, 155-mm Mk 3 SP gun and 155-mm Palmaria/TAM SP gun;
(mortars) 81-mm (3.2-in) Brandt and 120-mm (4.7-in) Brandt;
(MRLs) 105-mm SLAM-Pampero and 127-mm (5-in) SAPBA-1; and
(SSM) Condor I;
**Anti-armour weapons:** 89-mm (3.5-in) M65 rocket-launchers; 75-mm (2.95-in) M20, 90-mm (3.54-in) M67 and 105-mm M968 recoilless rifles; 105-mm Kürassier SP tank destroyer; and SS.11, Cobra, Mamba, Bantam and Mathago ATGWs;
**Anti-air weapons:** (towed) 20-mm Rh202, 30-mm HSS816 Hispano-Suiza, 35-mm GDF-002, 40-mm Bofors L/60, 40-mm Bofors L/70, 40-mm Bofors M1 and 90-mm M117; and
(SAMs) Blowpipe, SA-7 'Grail', Tigercat and Roland; and
**Small arms:** 9-mm Browning Hi-power pistol; 9-mm PA3-DM and 0.45-in M3A1 sub-machine guns; 7.62-mm FN-FAL rifles; and 7.62-mm FN-MAG and 12.7-mm (0.5-in) Browning machine-guns.

The reserves total 200,000 in the National Guard and 50,000 in the Territorial Guard. These and the regulars are supported by the 12,000-man paramilitary Gendarmería Nacional, which is equipped with Shorland armoured patrol cars, MOWAG Roland and M113 APCs in addition to personal sidearms, infantry small arms and support systems such as light mortars and rocket-launchers. There is also an air division of the Gendarmería which has 24 fixed-wing and 10 rotary-wing aircraft of various types.

The army aviation command (Aviación del Ejercito) is divided into an aviation battalion of five detachments and a support company. It has a total of 70 fixed-wing aircraft (of which the most important are the three Aeritalia G.222s, three DHC-6 Twin Otters, 15 Cessna 182s and 20 Cessna U-17A/Bs) and some 100 odd helicopters including 18 Agusta A 109s, 18 Bell UH-1Hs, 14 Aérospatiale SA330 Pumas and 24 SA332B Super Pumas.

## The Navy

The 23,000-strong Argentine navy has been the recipient of much modern equipment since the end of the Falklands war. The flagship remains the light fleet carrier *Veinticinco de Mayo*, which now carries an enhanced air group of 18 Dassault-Breguet Super Etendards, McDonnell Douglas A-4Q Skyhawks and Grumman S-2E Trackers together with four Aérospatiale Alouette III and Sikorsky SH-3D Sea King helicopters. The engine problems which apparently kept the *Veinticinco de Mayo* from playing a more prominent part during the Falklands war have now been cured.

The submarine squadron of two 'Type 209' class units has also been reinforced by the first two of eventually four 'TR1700' class boats which are more suitable for long-range work including (it is thought) the ability to operate as far north as Ascension Island or even, with suitable refuelling at sea during the transit periods, around Gibraltar where much of the original logistic supplying for the first units of the Task Force was done.

The obsolete ex-American World War II destroyers (although armed with Exocet SSMs) have been deleted. They have been replaced by four MM.40 Exocet-armed 'Almirante Brown' class West German-built 'MEKO 360' type destroyers. The two British 'Type 42' air-defence Sea Dart-equipped destroyers are still in service, but are believed to be available for sale as a result of obvious spares problems. The shortfall in destroyer numbers has been made up by the acquisition of the first four out of six 'Espora' class 'MEKO 140' type MM.40-armed frigates being built in Argentina. These join three French-built 'A69' class frigates acquired in the late 1970s.

A force of seven patrol ships, most of which are converted ocean-going American tugs, complete the major surface ship listings. One of these is the *Comodoro Somellera* reported sunk by Sea Skua missile attack during the war, but actually undamaged.

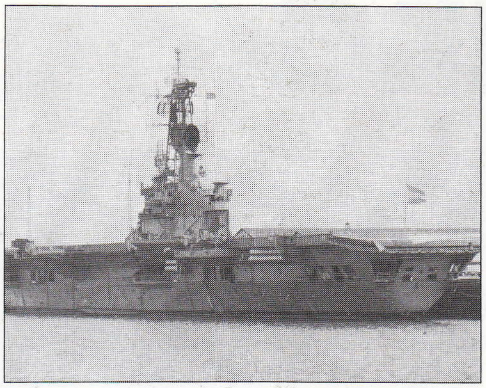
The amphibious warfare fleet has been reduced to two relatively modern LSTs backed by four LCMs and at least 20 LCVPs. They are used by the elite 10,000-man marine corps, which is divided into two fleet marine forces (of regimental and brigade size respectively) with an amphibious support force. There are also six marine security companies and a special forces swimmer/commando group. The small arms and support weapons are similar to those of the army, although the heavier equipment tends to be different. This includes Bantam ATGWs, Panhard ERC-90 Lynx armoured cars, LVTP-7 amphibious APCs, MOWAG Roland and Panhard VCR-TT 4×4 wheeled APCs, LARC-5 amphibious cargo carriers, 105-mm M101 howitzers, Tigercat and Blowpipe SAM systems, and 20-mm Rh202, 30-mm Hispano-Suiza and 35-mm GDF-002 towed anti-aircraft guns.

The Comando de Aviación Naval Argentina (CANA) or naval air arm is 3,000 strong and is divided into six naval air wings. Of these the most important is the 3rd which controls the three attack squadrons of 14 Super Etendards and 28 A-4Q Skyhawks plus the two ASW helicopter squadrons flying nine Alouette IIIs, four Sea Kings, several SA330 Pumas and a single Sikorsky S-61D for SAR work. Of the others the 2nd has the main reconnaissance element with one squadron of six maritime patrol and one Elint Lockheed Electra airliner conversions and the carrier-based squadron of six S-2E Tracker ASW/patrol aircraft. In the other wings there are three further combat squadrons flying 11 EMBRAER EMB-326GBs, six Aermacchi M.B.326Bs, six Aermacchi M.B.339As and 11 Beech T-34C-1 armed trainers. The navy also has a training school, plus one photo-reconnaissance, five general-purpose/liaison, one antarctic and two transport squadrons flying some 28 assorted fixed-wing aircraft and helicopters.

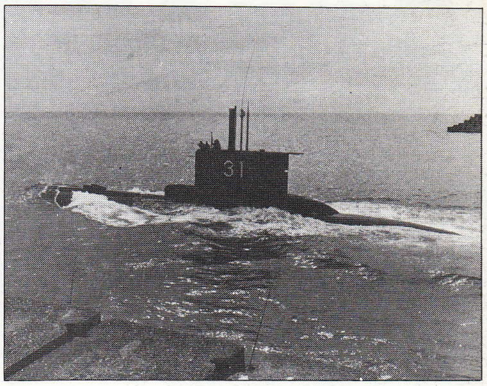
The strike squadrons have been trained specifically for anti-shipping tasks with the Super Etendards (equipped with AM.39 Exocets) and the A-4Q Skyhawks (equipepd with 227-kg/500-lb Snakeye high-drag iron bombs and locally produced Martin Pescador ASMs). Argentina is the third largest foreign customer for the Exocet, having bought a total of 212 MM.38, MM.40 and AM.39 rounds.

## The Air Force

The 17,000-man Fuerza Aerea Argentina (FAA) has rebuilt its strength and now deploys 10 air brigades, of which two belong to the air-defence command. This has four squadrons of interceptor/fighter-bombers flying 14 Dassault-Breguet Mirage IIIEA single- and three Mirage IIIBE/DA two-seaters, 19 Mirage IIICJ single- and three Mirage IIIBJ two-seaters, nine Mirage 5P single-seaters and up to 38 single-seat and four two-seat IAI Daggers. All the Daggers and Mirages have now been equipped for inflight-refuelling to increase their combat ranges.



***Fleet flagship* Veinticinco de Mayo *has undergone improvements to cure her of the engine trouble which plagued her in recent years.***

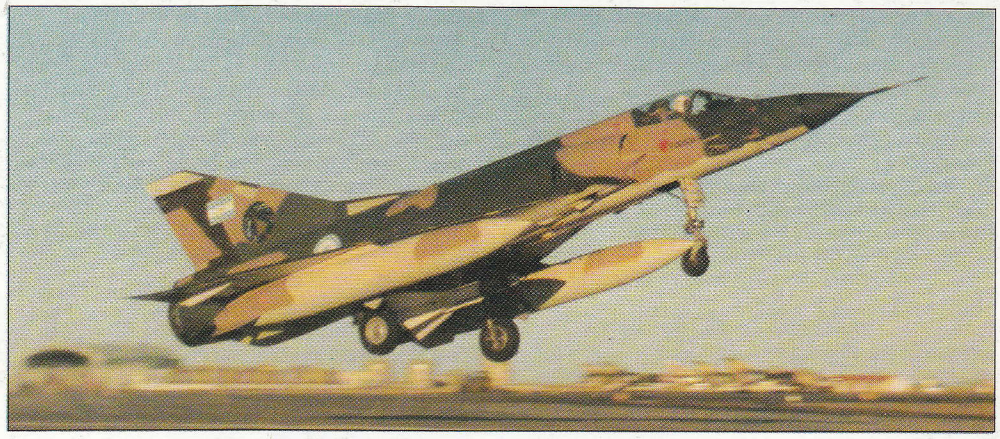


***The submarine* Sarta *was in dockyard hands throughout the Falklands war but her sister, the* San Luis, *carried out two unsuccessful attacks on the British.***

According to type they can carry Matra R.530, Matra R.550 Magic, Shafrir or AIM-9B Sidewinder AAMs.

The main ground-attack element is the air operations command of eight brigades. This has one light bomber squadron with six BAC Canberra B.Mk 62s, three attack squadrons with the 30 or so survivors of the 75 A-4B/C Skyhawks delivered from the USA (and now equipped with R.550 Magic AAMs and Durandal anti-runway bombs), and four COIN squadrons which have some 50 FMA IA-58A two- and IA-58C single-seat Pucará aircraft. There are also two helicopter gunship units with 12 Hughes 500Ms and six armed Bell UH-1Hs. Helicopter transport and SAR duties are performed in the command by three squadrons with some 33 aircraft, including eight Bell 212s, three UH-1Ds, 12 Super Pumas, five Aérospatiale Lamas and two Boeing-Vertol CH-47C Chinooks.

Fixed-wing transport and liaison duties are the responsibility of six further squadrons flying some 70 aircraft of 12 different types, the most important of which are three Boeing 707/KC-707 combined transport-tankers, eight Lockheed C-130E/H Hercules, two KC-130H tankers, 14 FMA IA-50 Guarani IIs and 13 Rockwell Shrike Commanders. A reconnaissance squadron flies one Elint-equipped Boeing 707 plus several camera-equipped variants of the IA-50 and Learjet 35A. There is also an antarctic support unit which has two specially-equipped fixed-wing transports plus a number of helicopters. Airfield air-defence is handled by Israeli 20-mm twin and Swiss 35-mm GDF-002 AA guns coupled to Elta and Super Fledermaus fire-control radars.



***Above: Now adapted for inflight-refuelling to increase their combat radius, Dassault-Breguet Mirages make up just over half the strength of the four interceptor/fighter bomber squadrons of the Argentine air force.***

***Below: Argentina is the most self-sufficient of the Latin American nations, producing MBTs and APCs under licence, and her own surface-to-surface missile. The FMA Pucará ground-attack aircraft, seen here, has also been exported.***